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Nº

164

CIA/RR ER 66-6

March 1966



INTELLIGENCE REPORT

US AND USSR: COMPARISONS OF SIZE AND USE OF GROSS NATIONAL PRODUCT

1955-64

DIRECTORATE OF INTELLIGENCE
Office of Research and Reports

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US AND USSR: COMPARISONS OF SIZE AND USE
OF GROSS NATIONAL PRODUCT*
1955-64

Summary

This report presents new estimates of the size of the Soviet economy compared with that of the United States. The new comparisons show the total gross national product (GNP) of the USSR and each major end use of GNP except defense to be significantly smaller than indicated by previous comparisons. The relative size of Soviet GNP is lowered by about 10 percent, but that of investment and government administration is smaller by about 20 percent. The difference is partly the result of a lower estimate of the ruble value of Soviet investment but, more importantly, of an arbitrary adjustment of the ruble/dollar price ratios for certain components of GNP. These adjustments attempt to take into account (1) the lower quality of Soviet durable goods, which in previous comparisons was assumed to be the same as in the United States, and (2) the lower productivity of Soviet workers in health and education and in administration, for which no allowance was previously made. These adjustments correct, in part at least, for the most important known biases in the US-USSR comparisons. The new comparisons are necessarily preliminary and imprecise and are believed still to overstate the size of the Soviet economy relative to that of the United States.

The new estimates show that in 1964 the gross national product of the USSR (US\$276.6 billion)** was considerably less than half of that of the United States. Consumption of the Soviet population compared less favorably than GNP -- well below two-fifths of US consumption. On a per capita basis, Soviet GNP was 38 percent of the US level, and Soviet consumption was 31 percent of that of the United States. But Soviet investment,

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 February 1966.

** In 1963 dollars. Based on the geometric average comparison.

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which reflects the high priority of economic growth, was a little over two-thirds of US investment, and Soviet defense expenditures were somewhat more than four-fifths of those of the United States. These relationships -- depicted in Figure 1 -- did not change significantly in 1965.

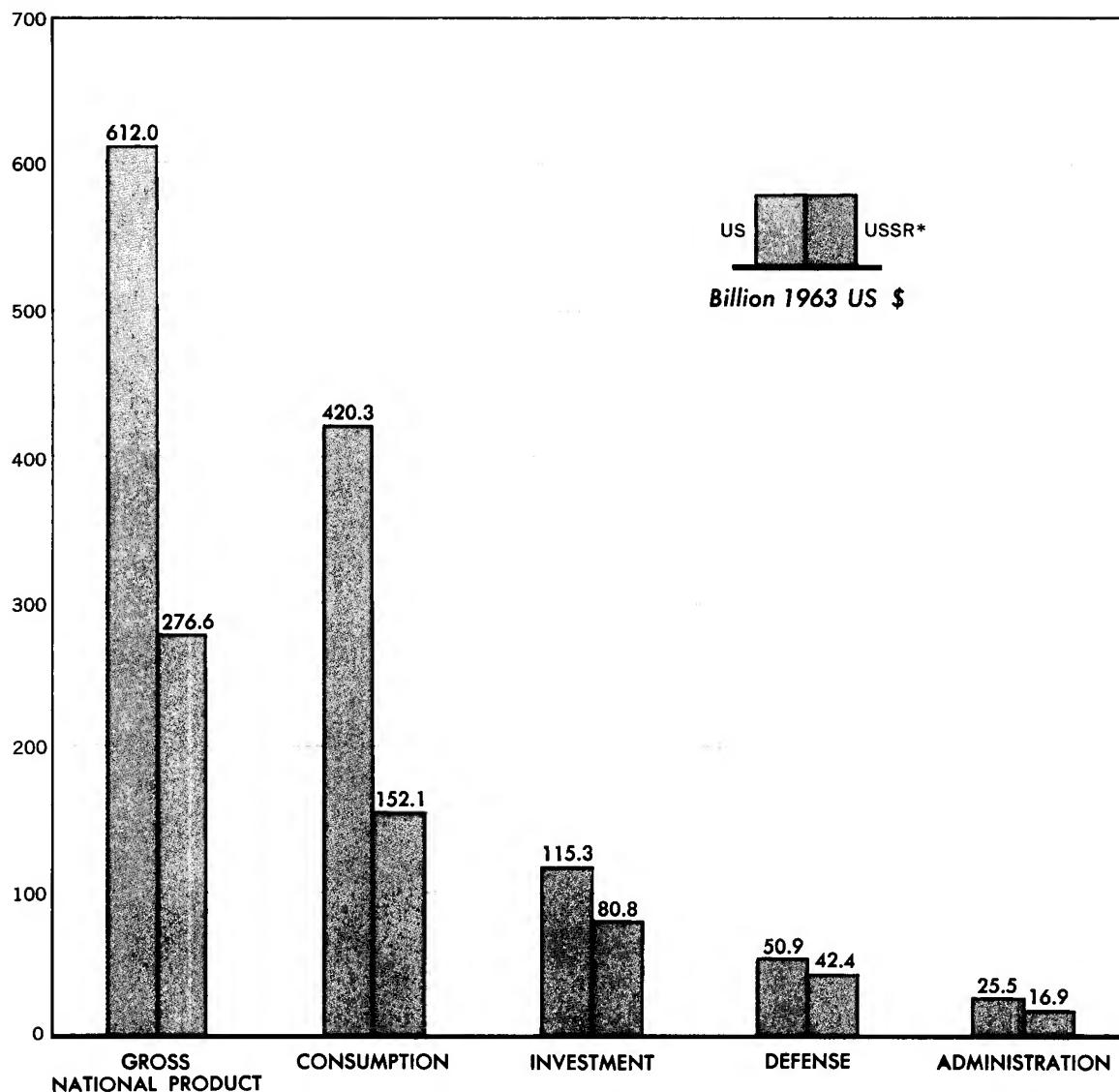
The relative positions of the USSR and the United States with respect to total GNP and each of the major end uses shifted significantly between 1955 and 1964, the most striking changes having occurred in the first four years of the period. Between 1955 and 1958, Soviet GNP rose from 38 percent to 45 percent of the US level, about where it stood also in 1964. Soviet consumption increased slowly as a percent of that of the United States -- from 32 percent in 1955 to 36 percent in 1964 -- most of the gain having taken place by 1958. In contrast, dramatic changes occurred during the period in the relative positions of investment and defense. The size of Soviet investment relative to that of the United States rose spectacularly during 1955-58 -- from 36 percent of the US level to 67 percent, with only a small further gain having been achieved by 1964. The relative size of Soviet defense expenditures, on the other hand, decreased markedly compared with those of the United States. In 1955, Soviet defense expenditures exceeded US expenditures by about 6 percent, whereas by 1958 they had dropped to 88 percent of the US level, and by 1964 they were only about 83 percent of the US level. In 1964, Soviet expenditures for government administration were about 66 percent of those of the United States, compared with 76 percent in 1955.

Important aspects of Soviet economic policy are illustrated by comparison of a group of strategic components of GNP that may be termed national policy expenditures. They include education, industrial investment, civilian research and development, foreign aid, and defense. In 1963 they represented 35 percent of total GNP (in dollars) in the USSR and 20 percent in the United States. The first three components reflect in broad terms the relative commitment of the two countries to the promotion of economic growth, and the latter two items reflect the commitment to the furtherance of foreign policy objectives. Taken as a whole, Soviet national policy expenditures

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Figure 1

US and USSR: Gross National Product, by End Use 1964



*Geometric average comparison

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(measured in dollars) were 95 percent of those of the United States, a small gain from the position in 1955. Expenditures connected with economic growth (geometric average comparisons), however, rose much more rapidly in the USSR than in the United States. Thus Soviet outlays on education were 73 percent of those of the United States in 1955 and 89 percent in 1963; industrial investment rose from 63 percent to 121 percent of the US level; and expenditures for civilian research and development rose from 31 percent to 53 percent of the US level. With respect to foreign policy expenditures, Soviet outlays on foreign aid increased substantially compared with the United States (from 9 percent to 23 percent measured in dollars), but Soviet defense expenditures declined substantially as a percent of those of the United States.

The comparisons shown in Figure 1 are the geometric averages of two comparisons of total GNP and its end uses in the United States and the USSR -- one when the GNP's of both countries are valued in dollar prices and the other when both GNP's are valued in ruble prices. The method of calculating the comparisons makes use of the domestic purchasing power of both the ruble and the dollar for specific goods. These ruble/dollar price ratios for a representative sample of goods and services in each economy are used to convert the components of Soviet GNP into dollars and, conversely, the components of US GNP into rubles.

The two comparisons of GNP, the one in rubles and the other in dollars, are substantially different. The ratio of Soviet to US GNP in 1964 in dollars was 56 percent and in rubles, 36 percent; for consumption and investment the ratios were 45 and 80 percent in dollars and 29 and 62 percent in rubles. These differences in the ratios are the result of wide differences in the patterns of output and in the relative prices in the two countries. Since each country's prices reflect its own and not the other country's costs and scarcities, neither comparison is preferable to the other. The geometric average of the two comparisons is believed to provide a better measure of the relative production capabilities of the two economies than is given by either the ruble or the dollar comparison.

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I. Introduction

Comparative gross national products and their distribution by major end uses (consumption, investment, defense, and administration) in the United States and the USSR are used extensively for a variety of purposes. The comparisons of total GNP's provide the most comprehensive available measure of the relative sizes of the US and Soviet economies and of their relative performance and potential. A comparison of the relative sizes of the major end-use components provides some insight into the policy choices of the two countries in allocating resources to the welfare of consumers, the future growth of the economy, and the strategic objectives reflected in military and space programs. Finally, comparative measures of production are used selectively by both sides as propaganda in the cold war -- a natural result of the great emphasis placed on economic competition between the United States and the USSR, not only by the Soviet leadership, with its boasts of catching and surpassing the United States, but also by the rest of the world.

This report presents new estimates of the relative levels and rates of growth of GNP and its major end uses in the United States and the USSR during 1955-64. Because these estimates differ significantly from previous estimates by this Office, the report also describes the general methodology for the derivation of the estimates and explains the basis for changing them. Section II of the report therefore describes the general methodology and rationale underlying the new estimates, and Section III gives the new comparisons of GNP and its end uses in the two countries -- one in dollars, one in rubles, and an average of these two -- and shows how these comparisons differ from the ones previously made. In addition, comparisons of a more restricted set of expenditures -- termed national policy expenditures -- are shown; they include annual outlays on education, civilian research, foreign aid, industrial investment, and defense. By way of preface, some general remarks are in order about the meaning that can be attached to international comparisons of GNP's and about the fundamental statistical problem involved in converting the GNP's of two countries into a common currency.

A. Some General Considerations in International Comparisons of Gross National Product

Some cautionary words are in order with respect to the meaning and conclusions that should be drawn from international comparisons of outputs valued at constant prices, such as those for the United States and the USSR presented in this report. First, what is measured is the relative monetary valuations of goods and services produced and not their relative utilities. Consumers in the USSR, in contrast to the United States, do not exercise any significant degree of sovereignty over the pattern of consumption that is provided -- and even if they did, the quantitative comparison of consumption in the two countries would not, as all philosophers agree, represent relative consumer satisfaction.

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This familiar theoretical point holds also for investment and defense. The dollar value of Soviet investment in a given year does not measure the growth-inducing potential (that is, utility) of that investment compared with US investment or even with Soviet investment in other years. The critical measure of growth potential is the additional output yielded by a unit of new investment, which may be very different in the two countries and may vary greatly from year to year in the same country. Finally, statistical comparisons of expenditures on defense (military and space programs) are particularly elusive in meaning. Although military expenditures may be roughly equal in the United States and the USSR when Soviet military expenditures are valued in dollars, this does not mean that the military establishments in the two countries are equal in effectiveness or in military potential. The comparisons are made in terms of price ratios that reflect relative costs of various kinds of military output -- not firepower, mobility, or other attributes of military power. Moreover, some aspects of military power, such as past expenditures or geographic situations, do not enter into the comparisons at all.

A second caution is that the dollar value of Soviet end-use components does not measure "cost" to the Soviet economy in the sense, for example, of measuring the share of resources going to investment or the "burden" of defense. The concept of "burden" or share of resources can be measured for each country only in its own domestic costs. For the United States, domestic costs can be approximated by prices. In the USSR, where prices are set arbitrarily by the State, real costs cannot be estimated, and the burden of defense in the sense of consumption or investment foregone is susceptible of no simple quantitative measure.

B. The Index Number Problem

The necessary condition for comparing two combinations of heterogeneous outputs is to express them as value totals using the same unit values or prices for each kind of output. A traditional procedure has been to convert the GNP in domestic currency values of one country into the currency of another country by the international currency exchange rate. This procedure is meaningless when the exchange rate is arbitrarily set and foreign trade is a tightly controlled state monopoly as in the USSR. Even in the case of predominantly private trade between two private enterprise economies, the exchange rate reflects prices only of goods and services that are traded internationally and hence is not representative of the full range of output included in GNP.

In this report the outputs of the United States measured in dollars and of the USSR measured in rubles are expressed in common value terms, using calculated average ruble/dollar ratios that reflect the relative internal domestic prices for identical goods and services in the two countries. The general procedure used to calculate the

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average ruble/dollar ratios may be illustrated by a description of the derivation of the ruble/dollar ratio for the food subcomponent of consumption. First, the prices of a representative sample of food items (48) were collected in both countries, and the ratio of the ruble to the dollar price of each item was calculated. Two averages of the ruble/dollar price ratios for these 48 items were then calculated, using as weights the expenditures they represent in the United States and in the USSR, respectively. The average ruble/dollar ratio weighted with US expenditures was then used to convert the dollar value of total US food production to rubles. Similarly, the average ruble/dollar ratio based on Soviet expenditure weights was used to convert all Soviet food production in rubles to dollars. In the former case the average ruble/dollar ratio is said to be US-weighted and in the latter, Soviet-weighted. The two average ruble/dollar ratios are different because the expenditure weights in the two countries are different. For example, consumption of potatoes represents almost 10 percent of Soviet expenditures on food but only 2 percent of US expenditures.

In comparing the size of GNP, or a component of GNP, of the USSR with that of the United States, two calculations are thus possible, corresponding to the two average ruble/dollar ratios. Soviet GNP may be converted to dollars by the Soviet-weighted average dollar/ruble price ratio, or alternatively, US GNP may be converted to rubles by the US-weighted average ruble/dollar price ratio. The GNP's of the two countries thus may be compared either in dollar prices or in ruble prices. Since the two average price ratios are different, the two GNP comparisons will be different. This difference is a reflection of a famous statistical paradox known as the index number problem; a time-honored resolution of this problem is to use the geometric average of the two, equally valid, comparisons whenever a single number is desired.

The index number problem arises in comparing the GNP's of the two countries because their patterns of output and prices differ greatly, reflecting differences in tastes, levels of income, natural resources, technology, and state of development, and because the relative quantities of goods produced and their relative prices are different in the two countries. All international comparisons of GNP's, /* including the present report, have found that the ratio of prices of goods between two countries is inversely related to the ratio of the quantities produced. In other words, in each country goods that sell at low prices tend to be produced in large quantities, and vice versa, and these goods are not the same ones in both countries. In the United States, for example, consumption goods are cheap in comparison with investment and defense goods, and the United States produces more of the former than of the latter; in the USSR, the situation is just the opposite.

* For serially numbered source references, see Appendix C.

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With respect to the comparison of GNP's the effect of the inverse relationship between relative prices and relative quantities produced between two countries is to show the size of one country to be larger compared with another when both GNP's are valued in the other country's prices. This direction of difference arises because, in converting the GNP's to a common currency, the relatively higher prices of the latter country are applied to the relatively larger quantities produced in the former, and vice versa. Thus, in the case of the comparisons of GNP and its components in the United States and the USSR, relatively high ruble/dollar ratios for consumption are associated with the relatively small size of Soviet consumption, and conversely, relatively low ruble/dollar ratios go with the higher relative size of Soviet investment, defense, and administration. As a result, Soviet GNP is shown to be a much larger percent of US GNP (56 percent in 1964) when the comparison is made in dollars than when it is made in rubles (36 percent in 1964).

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C. The Meaning of the Two Comparisons and of the Geometric Average

Strictly speaking, neither comparison really measures the difference in total output of the two countries, because no rigorous comparison of the total outputs of two countries is possible, except in the unlikely case that they are producing an exactly proportional mix of products. Since in practice the mix of products is different between countries and can be rendered in comparable terms only by valuing the products of one country in the prices (that is, the scarcity relations) of the other, the economic meaning of the comparison is in reality a hypothesis about what would result if one country were to shift its production to a mix of products proportional to the mix of products of the other country. 2/ But one can not be sure.

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This economic meaning of an international comparison is based on the presumption that a country can shift its pattern of production without significantly changing its existing relative costs or prices. Thus, in a comparison of US and Soviet GNP's measured in dollars, the implicit assumption is that the United States could shift to the Soviet pattern of production and still produce the same dollar value of output as before. On this assumption the comparison in dollar prices is an approximate measure of the relative ability of the two countries to produce the Soviet mix of output. The comparison of GNP's in rubles and prices is a measure of their relative ability to produce the US mix of output. The quantitative results are that the comparison in dollars is more favorable to the USSR and the comparison in rubles more favorable to the United States. This reflects the fact that each country is better not equipped to produce its own pattern of output than that of the other country.

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The geometric mean or average of the dollar and ruble comparisons is traditionally used when a single number is desired.* Although the geometric mean may appear to be a confused hybrid of two sets of relative prices, its economic meaning is as clear-cut as the meaning of either of the original comparisons. The geometric mean of the two comparisons of the GNP's of two countries is an approximate measure of their relative ability to produce an intermediate mix of output, midway between the actual mixes of the two countries. Looked at in this way, the geometric mean provides a measure of the production capabilities of two countries that is less biased than either of the comparisons in national prices.

These implicit assumptions are, of course, not entirely realistic. The dollar comparison assumes that the relative costs of producing the various kinds of output would not change if the United States tried to transfer resources so as to produce the Soviet mix. To make such a transfer, however, the United States would have to give up increasingly large amounts of output in exchange for the output more characteristic of the Soviet mix. The more the United States tried to duplicate the Soviet production mix, the more costs of production, in all probability, would tend to rise. As a result, if the United States produced the same product mix as the USSR, it would not show up as well relative to the USSR as it actually does in the dollar comparison made in this report. Similarly, the ruble comparison assumes implicitly that the USSR could shift to the production of the US output mix with no changes in unit costs or prices. Such an outcome would be most unlikely. Therefore, if the USSR attempted to produce the same output mix as the United States, the USSR would not appear in as favorable a light as it does in the ruble comparison shown in this report.

The dollar comparison and the ruble comparison thus overstate the relative ability of the US and the USSR, respectively, to produce the Soviet and the US mixes of output, respectively. As already stated, the traditional resolution of this problem is to use a geometric average of the two comparisons. It should be noted, however, that in comparisons of two countries at greatly different states of development, such as the United States and the USSR, the geometric mean tends to overstate the relative position of the less advanced country. The reason is that the more advanced country undoubtedly could shift to a less complicated product mix with less additional cost than would accrue to the less advanced country if it were to shift to a more complicated mix.

* The geometric average is used in preference to the arithmetic because, in general, economic growth and other changes proceed geometrically: that is, constant percentage increases describe the changes better than constant absolute increases.

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II. Method of Constructing the Comparisons

This report presents a comparison of GNP and its major end uses in the United States and the USSR for the years 1955-64. GNP consists of the aggregate value of all final sales, including the expenditures of households on consumption; the expenditures of government for health, education, administration, and defense; and the expenditures of households, government, and producing enterprises for gross investment. To obtain a distribution of GNP by end use, these expenditures are grouped into four major categories -- consumption, investment, defense, and administration. Tables 7, 8, 10, and 11 present the estimates of US and Soviet GNP and its end uses in rubles and in dollars for each of the years 1955-64.* The comparisons are made in 1955 rubles, because information on Soviet prices is not available in the necessary detail for a more recent year, and in 1963 dollars, because 1963 is the most recent year for which the US data are available in the required detail. The general method used was first to calculate Soviet GNP for 1955-64 in constant 1955 rubles and US GNP for 1955-63 in constant 1963 dollars, with the total GNP for each country broken down into comparable end-use categories; and second to convert US GNP and its end uses to 1955 rubles and Soviet GNP and its end uses to 1963 dollars by means of average 1955 ruble/1963 dollar price ratios. These average ratios were calculated separately for defense, for administration, and for four subcomponents of consumption (food, nonfood goods, consumer services, and health and education) and three subcomponents of investment (machinery and equipment, construction, and inventories). The selection of these particular categories was determined primarily by the availability of US price indexes for derivation of the 1955 ruble/1963 dollar ratios and for conversion of US GNP from current dollars to 1963 dollars.

A. Estimation of Gross National Product and End Uses

Unlike the United States and most other industrialized countries, the USSR does not publish estimates of GNP. Published Soviet data are couched in terms of the Marxian concept of "material product," which differs substantially from the Western definition of GNP. Soviet GNP, therefore, had to be estimated independently from the inadequate published official statistics and from a variety of other bits and pieces of information. The procedure required the laborious calculation of ruble values for dozens of individual components and their aggregation into major end-use categories that conform as nearly as possible to Western definitions. The basic estimates were calculated for the year 1955 in 1955 ruble prices.** For the years 1956-64, the values for the end-use categories -- consumption, investment, defense, and administration -- in 1955 prices were obtained by use of end-use volume indexes constructed

* Pp. 44, 45, 49, and 50, respectively, below.

** For detailed sources and methods used to estimate Soviet GNP, see
[redacted] the footnotes to Table 8.

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for the individual components. Estimates of total Soviet GNP in 1955 ruble prices for the years 1956-64, however, were obtained by moving the 1955 estimate forward by the weighted sum of indexes of GNP by sector of origin -- industry, construction, agriculture, transportation, communications, and services. Such an index gives a more accurate volume indicator of year-to-year change in total GNP than does an index based on a summation of end-use components because of the inability to measure accurately (1) inventory change in real terms and (2) net foreign investment. Although the two indexes do not differ significantly for the period as a whole, as can be seen in Table 8, the sector-of-origin approach gives values for total GNP in some years that differ by a few percentage points from those obtained by summing the four end-use components.

For the United States, estimates of total GNP and its components in current dollars are published by the Department of Commerce.* The estimates in current dollars were expressed in 1963 dollars by means of implicit price indexes for subcomponents of the end-use categories that can be derived from data given in publications of the Department of Commerce and the Council of Economic Advisers. The breakdown of GNP by major end uses as shown in Table 7, however, differs from that published by the Department of Commerce, because the data for various subcomponents of GNP had to be reclassified among the end uses in order to obtain end-use categories comparable in definition to those permitted by available Soviet data. The alternative procedure of adjusting the Soviet data to match the US definitions could not be employed, because of the inadequate detail of published Soviet statistics. The reclassification of the end-use categories of US GNP is presented in Table 5, and the derivation of the subcomponents of consumption and investment is explained in Table 6.** The definitions of each end use as referred to in this report are discussed below.

Consumption

This component includes total household expenditures on goods and services plus government noninvestment expenditures on health and education. This definition is required for comparability because in the USSR nearly all outlays on health and education are made by the government, while in the United States a significant share of expenditures for these purposes is made by households.

* The GNP data for the United States are those published prior to the revision in national accounts made by the Department of Commerce in 1965. Information on the revisions has not as yet been published in sufficient detail to permit their use in these comparisons. In any case, the nature of the revisions is such that the use of the revised series would not significantly affect the US-USSR comparisons of GNP and its major end uses.

** Pp. 39 and 42, respectively, below.

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Investment

This component includes gross investment in construction and in machinery and equipment as well as changes in inventories. It includes government stockpiling and investment in defense production facilities but not direct military construction and military equipment purchases, which are included in defense. Also included in investment for the United States are expenditures of state and local governments for the development of atomic energy, net foreign investment, and military assistance; the latter two items are not included in the figures for the USSR, however, because of lack of the requisite data to estimate them. To obtain comparability with the United States, expenditures on capital repair and civilian research and development, included under investment in published Soviet statistics, were deducted from Soviet investment. In the United States these expenditures are included in current costs (and prices) of other outputs and not as separate final output.

Defense

The defense category includes (1) pay, subsistence, and other current operational expenditures of the armed forces (including militarized security forces); (2) military construction and equipment expenditures; (3) military research and development (including all space) expenditures; and (4) atomic energy expenditures. Military pensions were excluded for both countries because they are merely transfer payments.

Government Administration

For both countries this category is essentially a residual of current government outlays on goods and services not included in the three categories listed above. The figures for the USSR exclude the cost of administering state-owned enterprises because these overhead costs of enterprise management are included in product prices and appear, as in the US accounts, in the value of the final uses to which these products correspond. The estimates for the USSR, however, do include expenditures by the Communist Party, which serves as a key arm of government administration and control; also included are expenditures for nonmilitarized internal security activities, some of which have no counterpart in the United States.

B. Derivation of Ruble/Dollar Ratios

Having obtained estimates of GNP by end use for the two countries that are comparable in definition -- one for the United States in 1963 dollars and the other for the USSR in 1955 rubles -- it is then necessary to express the estimates in a common currency in order to measure the relative positions of the two countries. The next step in the derivation of the comparison, therefore, was to obtain two sets

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of appropriately weighted, average ruble/dollar price ratios, one set with US weights for converting Soviet GNP by end use into dollars and the other set with Soviet weights for converting US GNP by end use into rubles.* The desired ratios were derived in three steps: (1) basic ratios for 1955 were calculated as accurately as possible with available data for the four subcomponents of consumption and the three subcomponents of investment previously listed, for defense, and for administration; (2) these 1955 price ratios were converted to 1955 ruble/1963 dollar ratios by dividing them by appropriate US price indexes; (3) for reasons that will be explained below, certain of these basic ratios were raised arbitrarily to correct in part for known biases in the data. The derivation of the final ratios is shown in Table 9.**

1. Calculation of the Basic Ratios

For consumption and for investment, the prices of a representative sample of presumably identical goods and services in the two countries were collected for the year 1955 (when the most information for the USSR is available), and a ruble/dollar price ratio was computed for each product or service by division; the ratios for the individual products and services were then grouped into subcomponents -- four for consumption and three for investment -- and two average ratios for each subcomponents were computed by weighting the individual ratios by the value of sales in 1955 in each country; and these average ruble/dollar ratios for 1955 were then converted to 1955 ruble/1963 dollar ratios by dividing them by appropriate US price indexes. For defense, the ruble/dollar ratios were derived as a byproduct of the calculation of defense expenditures as a component of GNP in the USSR. These expenditures were estimated for 1955 by valuing the various components of Soviet military programs both in 1955 rubles and in 1963 dollars. For the years 1956-64, dollar and ruble valuations were obtained by moving the 1955 estimates forward by physical volume indexes. Ruble/dollar ratios for defense as a whole and for individual components in each year were derived from these valuations by division. US defense expenditures in dollars were similarly estimated for individual components and converted to rubles using the ruble/dollar ratios obtained in the valuation of Soviet programs. For administration, the ruble/dollar ratio is based on a single comparison -- namely, the average annual wages of employees in government administration in the two countries in 1955, converted to 1955 rubles and 1963 dollars by dividing the ratio for 1955 by an index of average wages of government employees in the United States.

2. Adjustment of Certain Ratios

In deriving the final ratios used to convert the end uses of US and Soviet GNP to common currencies, several of the basic ratios

* For a more detailed explanation of the derivation of the basic ruble/dollar ratios, see Appendix A and the footnotes to Table 9, p. 47, below.

** P. 46, below.

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derived as described above were raised arbitrarily. The adjustment of these ratios represents an attempt to allow, albeit in an arbitrary manner, for a bias in the data that cannot be measured precisely but that tends to overstate the position of the USSR relative to the United States. In other words, it is an allowance for a known bias in a known direction, but of unknown size, in the comparisons as measures of relative production capabilities of the two countries. The adjustment is preliminary and necessarily imprecise, but is regarded as minimal in the sense that a correct adjustment arguably could be much larger but is not very likely to be smaller. The considerations underlying the adjustment are both general, relating to the nature and meaning of the basic data themselves, and specific, relating to the rationale for adjusting the individual ratios.

a. Uncertainties and Biases in the Data

Each step of the calculations described in the sections above involves inadequate data. In assessing these calculations and the nature of the Soviet data involved, the most illuminating hypothesis to be borne in mind is "Murphy's law" -- whatever can go wrong will go wrong. Because of the nature and shortcomings of national income data published by the USSR, an estimate of Soviet GNP must be pieced together from announced budget and expenditure data that are incomplete, inconsistent, and only dimly understood. For example, in the Soviet national budget for 1963, 8 billion rubles (9 percent of the total) were simply unidentified as to purpose. This amount had to be allocated somehow or other between final product expenditures and transfers or disguised subsidies to producing enterprises. Furthermore, farm income in kind, a large part of consumption, must be quite independently estimated, and the data with which to do this are extremely meager.

The skimpiness of Soviet announced data, however, is perhaps less serious a problem than is interpretation of the nature of the economic activities that the data purport to measure. This report seeks to compare the values of the final products of the two economies. However, what are final products in the USSR is far from obvious. This question arises (1) in the accounting sense -- what sales are sales to final users -- and (2) in the physical sense -- what are the exact goods and services which these sales consist of. An indispensable auxiliary question is -- at what prices are these goods and services actually entered into the reported sales. A centrally planned economic system shapes the answers to these questions quite differently from a market system.

The scarcity and the ambiguous character of Soviet expenditure data for the most part imply a margin of error that may fall in either direction. In other words, the estimate of Soviet GNP in rubles has a range of uncertainty, which, however, is probably small. The estimates in this report agree fairly closely with independent calculations made by several Western students of the Soviet economy.

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Although the estimate of Soviet GNP in rubles is considered to be reasonably satisfactory, the same cannot be said for the basic ruble/dollar ratios. Every attempt was made to match products in the two countries as exactly as possible, but the data problems encountered in the attempt are such as to produce ruble/dollar ratios that clearly overstate the value of Soviet output compared with US output. These problems relate primarily to the physical composition of the outputs (individual products) being compared. Following are illustrations of just a few of these problems. In calculating the ruble/dollar ratios for individual durable goods, it was necessary in many instances to match Soviet products with US equivalents that are obsolete; in other instances, Soviet products had to be matched with superior US models. Moreover, the quality of workmanship and the product durability of Soviet products were assumed to be those of the listed specifications, whereas actual performance is known to be greatly inferior to norms and standards. Furthermore, many types of equipment sales in the United States are accompanied at no extra charge by a warranty, initial troubleshooting services, training of operators if need be, and help in planning the most efficient integration of the equipment into the production process.* These auxiliary services are usually missing or ignored in the USSR, and their absence makes otherwise identical physical products different, less costly, and less useful. To some degree all these problems imply that the Soviet goods are inferior to the US counterparts and therefore that their equivalent dollar cost is less than shown by their ruble/dollar ratios. These problems are present also in the comparison of construction in the two countries.

The overall mix and pattern of Soviet production also leads to a sample bias in favor of the USSR. Soviet planners have concentrated on the mass production of a relatively small list of simple general-purpose goods -- three or four models of cars, standard machine tools, small uniform apartments rather than single-family urban houses, and so on. The absence of diversity of models and of a variety of specialty equipment is characteristic in the Soviet mix of producers' durables.** Ruble/dollar ratios based only on such standard items clearly are inadequate indicators of the relative ability of the two

* With respect to producers' equipment, however, it should be noted that since the prices compared in this report ^{4/} are f.o.b. producer's station, net of packing, auxiliary services are not explicitly in the US price, although some may be included implicitly. Their exclusion would be another example of sample bias discussed below. The same can be said of transportation and distribution charges, which are excluded from the price comparison, and which evidently are a larger percent of purchasers' prices in the US than in the USSR. This raises the supposition that these are more useful but costly services which are being neglected or inadequately performed in the USSR.

** The sample of products used to derive ruble/dollar ratios thus is necessarily limited almost exclusively to standardized, mass-produced items, and does not take account of the variety of specialty equipment that looms large in the US product mix and that would be very costly to produce in the USSR.

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industries to produce. This bias is reinforced by the nature of the available sample of Soviet prices, which consists almost entirely of shelf items; prices for such special-purpose items as were produced are unavailable.

One final problem occurs in the use of costs (wages and materials) to measure the value of output of services in education, health, and government administration. In the USSR these costs consist largely of wages and salaries. The basing of ruble/dollar ratios on a comparison of average wages, as is done in this report, assumes equal productivity of labor in the two countries and thus clearly overstates the output of services in the USSR relative to the United States.

b. Justification for Raising Individual Ratios

The statistical problems stemming from the deficiencies of data described above are insoluble by the analyst making these comparisons. The data upon which to base precise adjustments for quality, longevity, diversity, and the mix of output are not available. Those aspects of incomparability of products that could reasonably be allowed for have already been taken into account in calculating the basic ruble/dollar ratios. The problem that remains is to allow for a bias of known direction (in favor of the USSR) but of unknown size. The solution adopted here is to raise the ruble/dollar ratios most affected by the biases by an arbitrary, uniform 20 percent. The ratios are (1) in consumption, the ratios for radio and television equipment, electrical and other appliances, and automobiles in the subcomponent nonfood goods, and the wage component of the subcomponent health and education; (2) in investment, the ratios for machinery and equipment and for construction; and (3) the ratio for government administration. (For a comparison of original and adjusted ratios, see Table 9.*)

With respect to consumer durables, the difficulties of matching Soviet and US products were such as to impart a consistent downward bias to the ruble/dollar ratios.** In general, Soviet durables such as automobiles, washing machines, and refrigerators resemble models produced in the United States before World War II. Soviet products had to be compared, for the most part, with the cheapest US models, and even these were generally superior to the Soviet goods in appearance, workmanship, and operating features of one kind or another. Left out of the comparison entirely, for lack of Soviet counterparts, were the bewildering varieties of modern durables available to US consumers -- such as fully automatic washing machines, clock-radios, dryers, and the like -- which would be relatively high-cost products in the USSR. Although comparative measures of longevity and durability are not available, it

* P. 46, below.

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is clear from the number of complaints in the Soviet press about short service life, constant breakdowns, and unsatisfactory repair services that US consumer durables far outlast their Soviet counterparts. By way of illustration, the press reports that in a recent year 16,000 refrigerators of a certain model were delivered to Moscow customers, and 13,000 calls for repairs on these models were made within a short period of time. 6/ The Soviet press also provides much evidence that Soviet radios and television sets are inferior to US products in reliability and general performance. 7/

With respect to machinery and equipment the evidence available from the Soviet press and from the reports of foreign observers and users of Soviet products shows clearly that their quality is far inferior to that of producers' durables in the United States. This evidence is cited in detail in a series of reports by this Office dealing with individual industries. Soviet jet aircraft engines have a short service life compared with those in the United States 8/; all models of tractors and grain combines are underpowered 9/; the service life of some kinds of pumps used in the chemical industry is measured in hours, and the springs and valves in some types of compressors must be replaced every week; and Soviet-produced tires average from one-half to two-thirds fewer miles of wear than US tires. 10/ In recent years, Western engineers have been able to observe a wide variety of Soviet construction equipment in use in underdeveloped countries; their over-all assessment has been that it is generally less efficient, less durable, and more difficult to operate than Western equipment. A recent US delegation to the USSR concluded that Soviet machine tools continue to be less durable, more prone to breakdown, slower, and less precise than US machine tools. 11/ The experience of underdeveloped countries that have imported Soviet equipment provides additional evidence. Thus the teeth of shovels sent to Turkey wore smooth after 70 to 80 hours of excavation; tractors in Iraq required major overhaul after 500 hours of operation compared with 2,000 hours for Western tractors; in Burma, bulldozers and scrapers became inoperable after a few weeks of use, and mechanical problems were chronic with jeeps, trucks, generators, and loading cranes; in Cuba, blades of bulldozers broke at the slightest strain, 3 out of 10 bulldozers allegedly failed in the first 50 hours of operation, and in one province 80 out of 120 tractors broke down in less than 2 months; and in Egypt and Afghanistan, serious deficiencies in durability and operation were experienced with respect to a wide range of heavy construction equipment. 12/

In addition to inadequate allowances for quality differences, the ruble/dollar ratios are biased downward because they do not take into account the Soviet inability to produce efficiently the complex and special types of equipment that are very important in the US product mix but are not represented at all in the sample of ruble/dollar ratios. The possible magnitude of this bias may be illustrated by the results of a recent study of the costs of Khrushchev's chemical program. 13/ This study compares the ruble cost of building the planned capacities for fertilizers, plastics, and synthetic fibers with a calculated dollar cost of the same capacities and yields a ruble/dollar

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ratio of 1.5 to 1 compared with a ratio of 0.5 to 1 for all industrial investment based on the sample of products used in this report.

The low quality of Soviet construction is well known both to the Soviet citizens themselves and to Western observers. The evidence is summarized in a series of reports by this Office. 14/ The Soviet press itself in words and photographs provides the best source for a judgment as to the comparative quality of US and Soviet construction. The problems range from poor materials -- large percentages of broken bricks, poor cement (20 percent below US quality standards), and excessive breakage of window glass -- to poor construction work -- bad finish, plumbing, and wiring and frequent structural failures and collapses. A delegation of construction experts that visited the USSR recently concluded that Soviet construction was "unbelievably" bad; one member of the delegation stated that with few exceptions the construction projects that they saw would not pass inspection in the US. So shoddy was the work in many buildings that a great deal of expensive repair and replacement would be needed to keep them habitable.

In the case of administration and of the wage component of health and education services the adjustment of the ruble/dollar ratios represents an allowance for differences in the productivity of labor in the two countries. For both categories, outputs are measured in terms of inputs, largely labor, and the ruble/dollar ratios are mainly wage ratios. This procedure assumes equal productivity -- that is, equal quality of these inputs -- clearly an incorrect supposition. The physical capital equipment available to US workers in health, education, and government exceeds that available to their Soviet counterparts probably by a large margin. In addition, the average educational levels of the two groups are quite different. The average US worker employed in health services had (in 1959) 11.5 years of schooling, compared with 9.0 years for the average Soviet worker in that field. For workers in the field of education the corresponding achievements are 15.2 and 10.4, and in government administration they are 11.5 and 8.5. Although direct measures of relative productivities cannot be made for these services, some notion of the probable magnitude of the difference is given by the fact that in industry, output per worker in the USSR is only about one-third of that in the United States and that in the economy as a whole, as measured by GNP per person employed, productivity is only about 30 percent of the US level. Finally, with respect to administration it should be noted that the ruble/dollar ratio does not include a materials component because of lack of the necessary data. Inclusion of materials would raise the average ruble/dollar ratio considerably, as was the case in the calculation of the average ratio for health and education.

3. Final Ruble/Dollar Ratios for Gross National Product and End Uses

The adjusted 1955 ruble/1963 dollar ratios for the subcomponents of consumption and investment, for defense, and for administration were then used to convert each of these components of US and Soviet

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GNP to rubles and to dollars, respectively, for each year during 1955-64. Total values for consumption, for investment, and for GNP as a whole (United States in rubles and USSR in dollars) in each year were obtained by addition of the appropriate components. Finally, ruble/dollar ratios for consumption, investment, and total GNP were calculated from the corresponding ruble and dollar values for the two countries.

The US-weighted and Soviet-weighted ratios, together with their geometric averages, for GNP and for each end use are shown for illustrative purposes in Table 12.* These average ruble/dollar ratios are the result of weighting appropriate subcomponent ratios separately for each year in the comparison by their respective shares in GNP in each year. An alternative procedure would have been to carry out the conversion using base-year weights (1955). The use of given-year weights, in fact, makes little difference. The geometric average of the two ratios for consumption declines slightly -- from 0.92 with 1955 weights to 0.90 with 1964 weights. The geometric average of the ratios for investment also declines a little (from 0.65 to 0.64). The ratio for defense is the most sensitive to the weights used, with the geometric average ranging from 0.33 using 1955 weights to 0.39 using 1964 weights. The ratio for administration remains constant at 0.21. The overall ratio for total GNP varies by only two one-hundredths as the weights change over time.

In any given year, however, the Soviet-weighted and US-weighted ruble/dollar ratios for GNP and for most of the end uses differ greatly. The extent of this difference between the two ratios varies considerably among the components, being greatest for consumption and least for defense. Among the subcomponents of consumption and investment the largest differences in the Soviet and US-weighted ratios are for health and education (0.24 compared with 0.57) and for machinery and equipment (0.39 compared with 0.71). In the case of health and education the large difference results from greatly different combinations of factor inputs in the two countries: in these fields the USSR, compared with the United States, uses more labor, which is relatively low paid in the USSR, and less materials, which are relatively high priced there. With respect to machinery and equipment the large difference in the two ruble/dollar ratios results from the great divergence in relative prices and pattern of output for producers' durable equipment in the United States and the USSR and the inverse correlation between the output ratios of the two countries and the corresponding price ratios. For example, the United States outproduces the USSR by far in automobiles, the ruble prices for which are high relative to US prices. On the other hand, the production of machine tools is relatively more important in the USSR than in the United States, but the ruble prices for machine tools are lower relative to dollar prices.

* P. 51, below.

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III. Comparisons of Relative Size of US and Soviet Gross National Product and Major End Uses, 1955-64

A. Comparative Size of Total Gross National Product

The final percentage comparisons of GNP in the United States and the USSR for the period 1955-64 are presented in Figure 2 and Table 1. The table gives three percentage comparisons: one is obtained when the GNP's of both countries are valued in rubles, another is obtained when the GNP's are valued in dollars, and the third is the geometric average of the ruble and the dollar comparisons. The ruble and dollar values are shown in Tables 7, 8, 10, and 11.* According to the data in Table 1, Soviet GNP in 1955 was less than one-third the US level when measured in rubles and a little less than one-half the US level when measured in dollars; the geometric average shows Soviet GNP to be somewhat less than two-fifths of US GNP. Soviet GNP increased rapidly in size relative to that of the United States during 1956-58, lost ground in 1959 and 1960, increased to a high of 46 percent (geometric average) of US GNP in 1961, and then declined slightly in relative size during 1962-64. Thus Soviet GNP has not gained on US GNP since 1958. In 1964, Soviet GNP was 36 percent of the US level by the ruble comparison and 56 percent of the US level by the dollar comparison; the geometric average is 45 percent. On a per capita basis, Soviet GNP is a smaller percent of US GNP than when total GNP's are compared. In 1955, Soviet per capita GNP was slightly more than two-fifths the size of US per capita GNP in dollar prices and about one-fourth as large in ruble prices. Soviet per capita GNP increased in size relative to the US over the period 1955-64, except for slight declines in 1959 and 1962. By 1964, Soviet per capita GNP was nearly 48 percent of the size of US per capita GNP at dollar prices and about 31 percent as large in ruble prices. In the geometric average comparison, Soviet GNP on a per capita basis was 32 percent of US per capita GNP in 1955 and 38 percent of US per capita GNP in 1964.

From an analysis of the average annual rates of growth of US and Soviet GNP in 1956-64, shown in Table 2, it is clear that the substantial increase in the relative size of Soviet GNP in the period 1956-58 is largely attributable to a considerable decline in the US growth rate rather than to any substantial acceleration in the Soviet rate, which was quite high during the three years. The decrease in comparative size of Soviet GNP in 1959-60 was due to both a substantial slowdown in the rate of growth of Soviet GNP and a considerable acceleration of the US growth rate after 1958. During the five years, 1960-64, Soviet GNP increased slightly as a percent of US GNP, because, although the Soviet growth rate continued to decline, the rate of growth of US GNP declined somewhat more.

* Pp. 44, 45, 49, and 50, respectively, below.

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Soviet Gross National Product as a Percentage of US Gross National Product
 1955-64

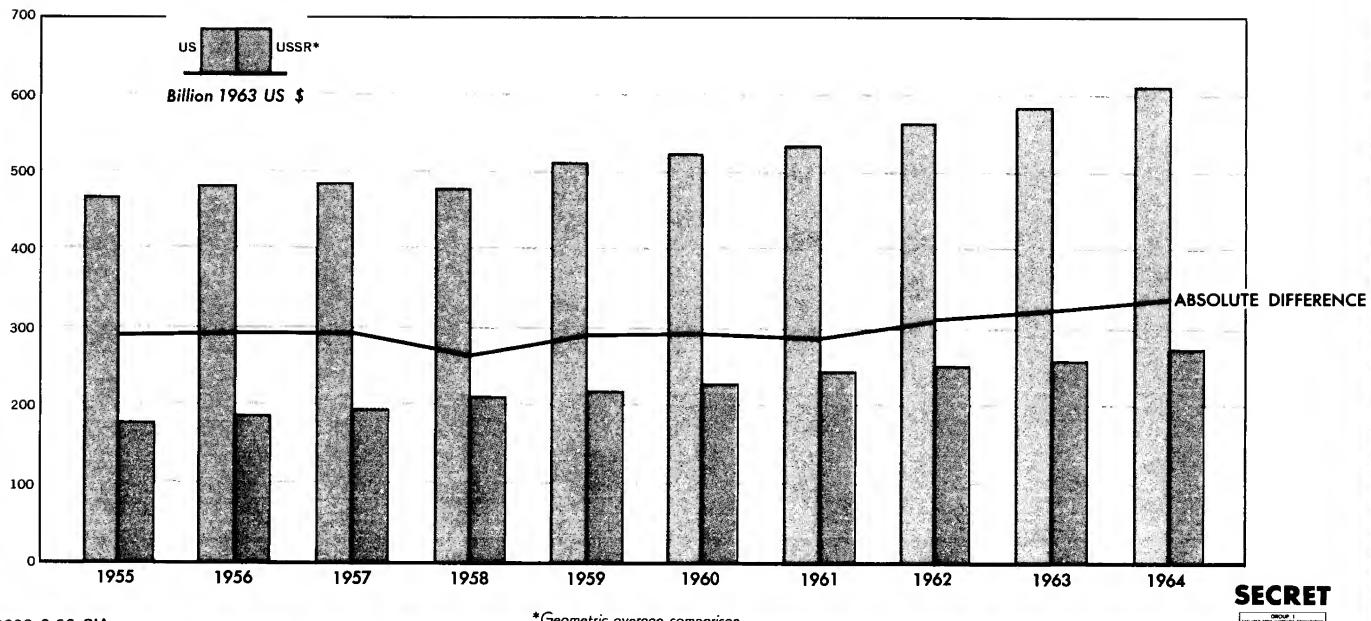
	USSR as a Percent of US									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Gross national product										
Ruble comparison a/	29.4	31.0	32.0	35.9	34.6	35.4	37.2	36.3	35.8	36.2
Dollar comparison b/	48.4	49.5	50.3	55.3	53.3	54.3	56.7	55.7	55.3	56.4
Geometric average comparison c/	37.7	39.2	40.1	44.6	42.9	43.8	45.9	45.0	44.5	45.2
Consumption										
Ruble comparison a/	25.3	26.1	27.3	28.8	28.5	29.0	29.8	29.8	29.4	29.0
Dollar comparison b/	39.4	39.6	41.4	43.1	43.0	43.5	45.0	45.5	45.3	45.3
Geometric average comparison c/	31.6	32.1	33.6	35.2	35.0	35.5	36.6	36.8	36.5	36.2
Investment										
Ruble comparison a/	31.9	37.5	44.1	59.7	55.6	56.2	61.4	57.9	58.7	61.6
Dollar comparison b/	40.0	47.4	55.3	74.7	69.7	71.0	77.8	74.5	76.1	79.8
Geometric average comparison c/	35.7	42.2	49.4	66.8	62.3	63.2	69.1	65.7	66.8	70.1
Defense										
Ruble comparison a/	96.9	91.9	80.9	82.7	82.6	85.7	80.3	79.8	79.2	81.5
Dollar comparison b/	116.0	108.1	93.2	93.7	91.7	93.8	86.3	84.4	82.5	85.1
Geometric average comparison c/	106.0	99.7	86.8	88.0	87.0	89.7	83.2	82.1	80.8	83.3
Administration d/										
Dollar comparison b/	76.5	81.9	79.2	68.7	71.4	71.0	72.6	72.2	70.1	66.3

a. Ruble values of Soviet expenditures in Table 8, p. 45, below, divided by the ruble values of US expenditures in Table 10, p. 49, below, and the quotient expressed as a percent.
 b. Dollar values of Soviet expenditures in Table 11, p. 50, below, divided by the dollar values of US expenditures in Table 7, p. 44, below, and the quotient expressed as a percent.
 c. The geometric mean of the ruble and dollar comparisons.
 d. Only the dollar comparison is presented; the ruble comparison would be the same because the Soviet-weighted and US-weighted ruble/dollar ratios used for administration are identical.

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US and USSR: Gross National Product 1955-64

Figure 2



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Table 2

US and USSR: Average Annual Rates of Growth
of Gross National Product, by End Use a/
1956-64

	Percent												
	1956-64 b/	1956-58 b/	1959-60 b/	1961-64 b/	1956	1957	1958	1959	1960	1961	1962	1963	1964
Gross national product													
United States	3.1	1.0	4.7	3.9	3.3	1.2	-1.5	7.0	2.4	1.5	6.2	3.1	4.8
USSR	5.5	7.5	4.3	4.6	8.3	4.7	9.4	4.0	4.6	6.1	3.6	1.7	6.9
Consumption													
United States	3.5	2.5	4.8	3.7	4.9	1.4	1.3	5.6	4.0	1.3	4.9	3.6	5.1
USSR	4.8	5.9	5.0	3.8	6.3	6.3	5.0	5.3	4.6	3.8	5.2	2.1	4.3
Investment													
United States	2.2	-5.1	8.8	4.7	1.6	-1.9	-14.4	18.9	-0.5	-0.5	10.5	2.6	6.8
USSR	9.9	16.6	5.8	7.1	19.0	15.2	15.5	11.7	0.2	8.4	4.7	3.6	11.9
Defense													
United States	1.4	0.7	-0.9	3.0	-1.8	5.9	-1.7	1.7	-3.4	6.2	9.1	0.4	-3.4
USSR	0.8	-2.9	2.4	2.7	-5.1	-5.4	2.1	2.8	2.0	0.7	9.9	1.2	-0.6
Administration													
United States	3.8	4.9	-0.2	5.0	-3.3	3.4	15.3	-3.8	3.4	4.3	3.7	3.1	9.0
USSR	2.1	1.1	1.7	3.1	3.4	0	0	0	3.3	6.5	3.0	0	2.9

a. US growth rates are calculated from the 1963 dollar values in Table 7, p. 44, below; the Soviet growth rates are calculated from the 1955 ruble values in Table 8, p. 45, below. The growth rate of Soviet GNP is based on the sector-of-origin series rather than on the sum of the end-use components.

b. The base year for calculating the average annual rate of growth is the year preceding the initial year of the given period.

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B. Comparative Size of Major End Uses of Gross National Product

The relative sizes of the US and Soviet economies differ considerably in regard to the major end-use components of GNP, as shown by the dollar, ruble, and geometric average comparisons of consumption, investment, defense, and government administration presented in Table 1 (see also Figure 3). The relative positions of the several end uses in the USSR vis-à-vis the United States also have changed markedly over the comparatively short period 1955-64. Thus, whereas in 1955 Soviet consumption and investment both were in the neighborhood of one-third that of US levels, by 1964 investment had risen to more than two-thirds of that of the United States, but consumption was still not far from one-third that of the United States. In contrast, the relative positions of defense and administration declined, the former considerably more rapidly than the latter. On the whole, these trends in the relative positions of the four end uses have proceeded fairly smoothly over the period, although there have been sharp changes in some years in one or another of the components.

Soviet consumption was about one-fourth of US consumption in 1955 at Soviet prices and about two-fifths at US prices. During the next eight years, Soviet consumption increased only slightly faster than US consumption and by 1964 was 29 percent of US consumption at Soviet prices and 45 percent at dollar prices. In the geometric average comparison, Soviet consumption was 32 percent of US consumption in 1955 and 36 percent in 1964; the corresponding percentages on a per capita basis are 27 and 31. The largest increase in the relative size of Soviet and US consumption occurred in the period 1956-58. In 1959 the relative size of Soviet consumption declined slightly from the previous year, then increased again moderately during 1960-62 and declined slightly in 1963 and 1964. The annual rates of growth of US consumption expenditures are quite steady for the period 1955-64, so that the slowdown in the gain in relative size of Soviet consumption during the latter years of this period is due almost entirely to a decrease in the rate of growth of Soviet consumption.

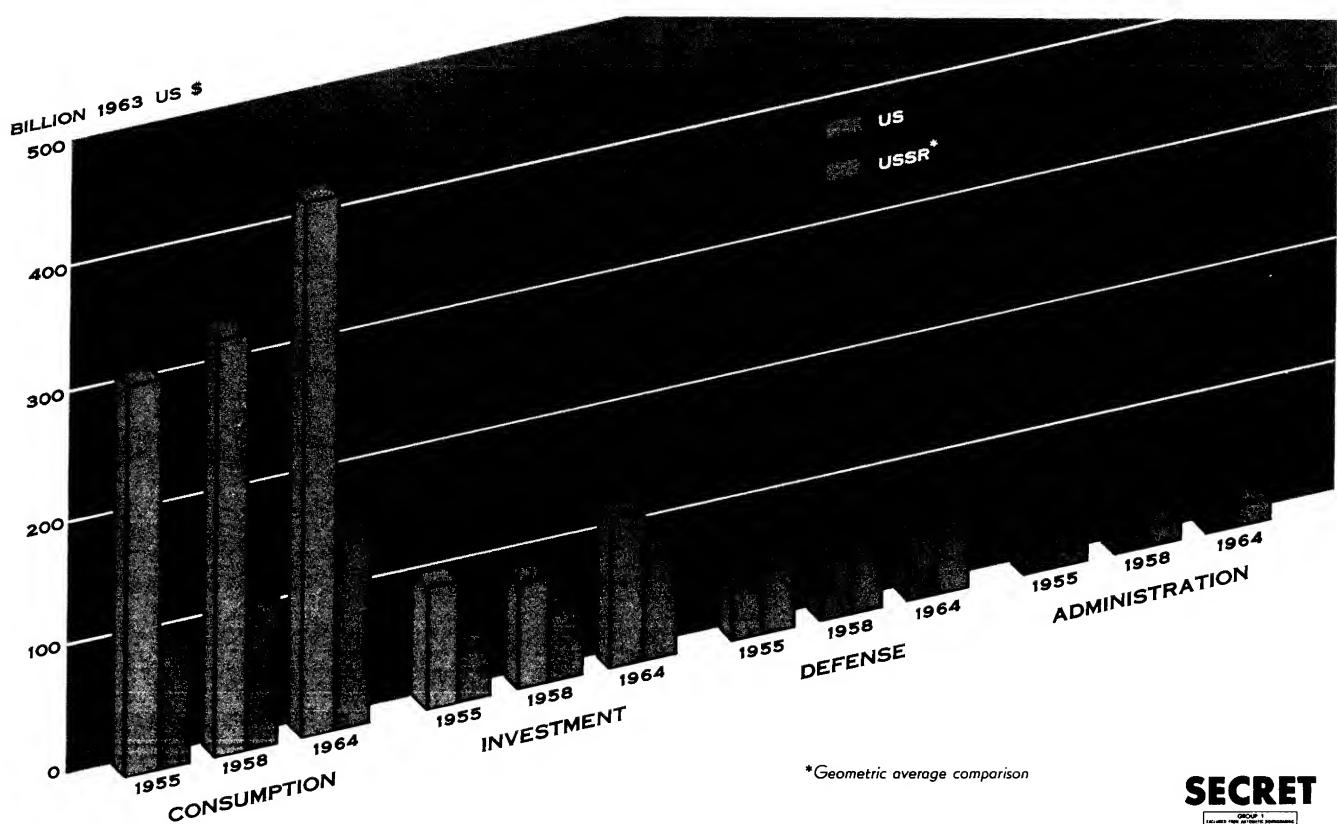
Although Soviet consumption as a whole approached two-fifths of the US level in 1964, total expenditures of private households on goods and services were less than a third of those of US consumers; expenditures on health and education in the USSR (largely by the government), however, approached two-thirds of outlays on these services in the United States. Private household consumption in the USSR gained slowly relative to the United States between 1955 and 1964, but expenditures on health and education relative to those in the United States declined slowly between 1955 and 1959 and then rose again to occupy in 1964 the same relative level as in 1955.

The size of Soviet total investment relative to that of the United States changed markedly during 1955-64. In 1955, Soviet investment was about a third the size of US investment at ruble

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**US and USSR: Major End Uses of Gross National Product
1955, 1958, and 1964**

Figure 3



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prices, two-fifths as large at dollar prices, and nearly 36 percent as large according to the geometric average. In the period 1955-58, Soviet investment as a percent of US investment almost doubled, and in 1958 Soviet investment was nearly three-fifths of US investment at ruble prices and three-fourths of US investment at dollar prices, the geometric average being two-thirds. The relative size of Soviet investment declined in 1959 and then rose to 69 percent in 1961, declined in 1962, and rose again in 1963 and 1964, when its relative position was only a little higher than in 1958. The spectacular increase in the relative size of Soviet investment during 1956-58 resulted from a very high rate of growth of Soviet investment expenditures (nearly 17 percent annually) and from an actual decrease in US investment. The much smaller increase in the relative size of Soviet investment during 1959-64 was due to a substantial decline in the rate of growth of Soviet investment expenditures (approximately 7 percent annually) and to an increase in the growth rate of US investment. The spread between the ruble and dollar comparisons for investment is smaller than that for consumption, indicating less difference in the Soviet and US price structures and output mixes for investment goods than for consumption goods.

Comparisons may also be made with respect to fixed investment, which makes up 85 to 90 percent of total investment in both countries. It represents the outlay on new plant and equipment and is calculated as the sum of construction and machinery and equipment. In most years, Soviet fixed investment is somewhat larger relative to US fixed investment than is Soviet total investment relative to US total investment, but the general trends and relationships are about the same for the two measures of investment.

The estimated size of Soviet defense expenditures relative to US defense expenditures declined significantly during 1955-64. As measured by the geometric average of the ruble and dollar comparisons, Soviet expenditures were 6 percent greater than US expenditures in 1955, but by 1964 the Soviet defense effort was only a little over four-fifths the size of that of the United States. The relative size of Soviet defense expenditures decreased sharply in 1956 and 1957, as a result of their absolute decline in these years, and in 1957 Soviet expenditures had fallen to less than nine-tenths of US expenditures. During 1958-60, Soviet defense expenditures rose slightly relative to those of the United States, but declined thereafter. In this period, Soviet defense expenditures rose, but US expenditures rose faster. Over the eight-year period the difference between the percentage comparisons in rubles and in dollars narrowed substantially, reflecting the fact that the Soviet and the US mixes of defense expenditures have become much more alike. The USSR has shifted more and more from a manpower-intensive defense effort to an increasingly sophisticated and relatively expensive modern weapons program. Soviet defense expenditures relative to those of the United States

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decreased considerably more slowly according to the ruble comparison than according to the dollar comparison. This difference indicates that defense costs in rubles are rising at an increasing rate vis-a-vis the United States, as the USSR shifts more and more toward an output mix in which its competitive advantage is less.

Inasmuch as the US-weighted and Soviet-weighted ruble/dollar ratios for government administration are the same, comparisons in rubles and in dollars are the same. Over the period 1955-64 as a whole, Soviet expenditures declined relative to US expenditures, but there were marked fluctuations within these years. In 1955 Soviet expenditures for administration were three-fourths of US expenditures. The proportion rose to four-fifths in 1956, declined to about two-thirds in 1958, rose to nearly three-fourths in 1961, and declined again to two-thirds in 1964.

C. Comparative Size of National Policy Expenditures

Table 3 and Table 13* and Figure 4 present estimates of the comparative size of US and Soviet outlays in 1955-63** on several strategic components of GNP which may be grouped under the rubric of national policy expenditures. They include education, industrial investment, civilian research and development, foreign aid, and defense. Such a comparison assesses the relative position and progress of the USSR vis-a-vis the United States in areas that directly reflect the declared policies of the USSR -- the achievement of rapid economic growth, especially in industry, and the promotion of foreign policy objectives through foreign aid and an expanding defense establishment.

Comparative expenditures on the first three components -- education, industrial investment, and civilian research and development -- reflect, in general, the relative commitment of the two countries to the maintenance of and increase in present rates of economic growth. Comparative outlays on education represent comparative investments in raising the average level of education of the labor force, an important factor in the rise of labor productivity that contributes to economic growth in modern industrial societies. Similarly, comparative expenditures on that part of investment allocated to the expansion of industrial plant and equipment show the willingness of the two countries to allocate present resources to achieve future growth; future power positions of the two countries will depend in part on such present resource allocations. Finally, a comparison of outlays on civilian research and development is useful for assessing the potential for growth that will ensue from technological improvements and new inventions.

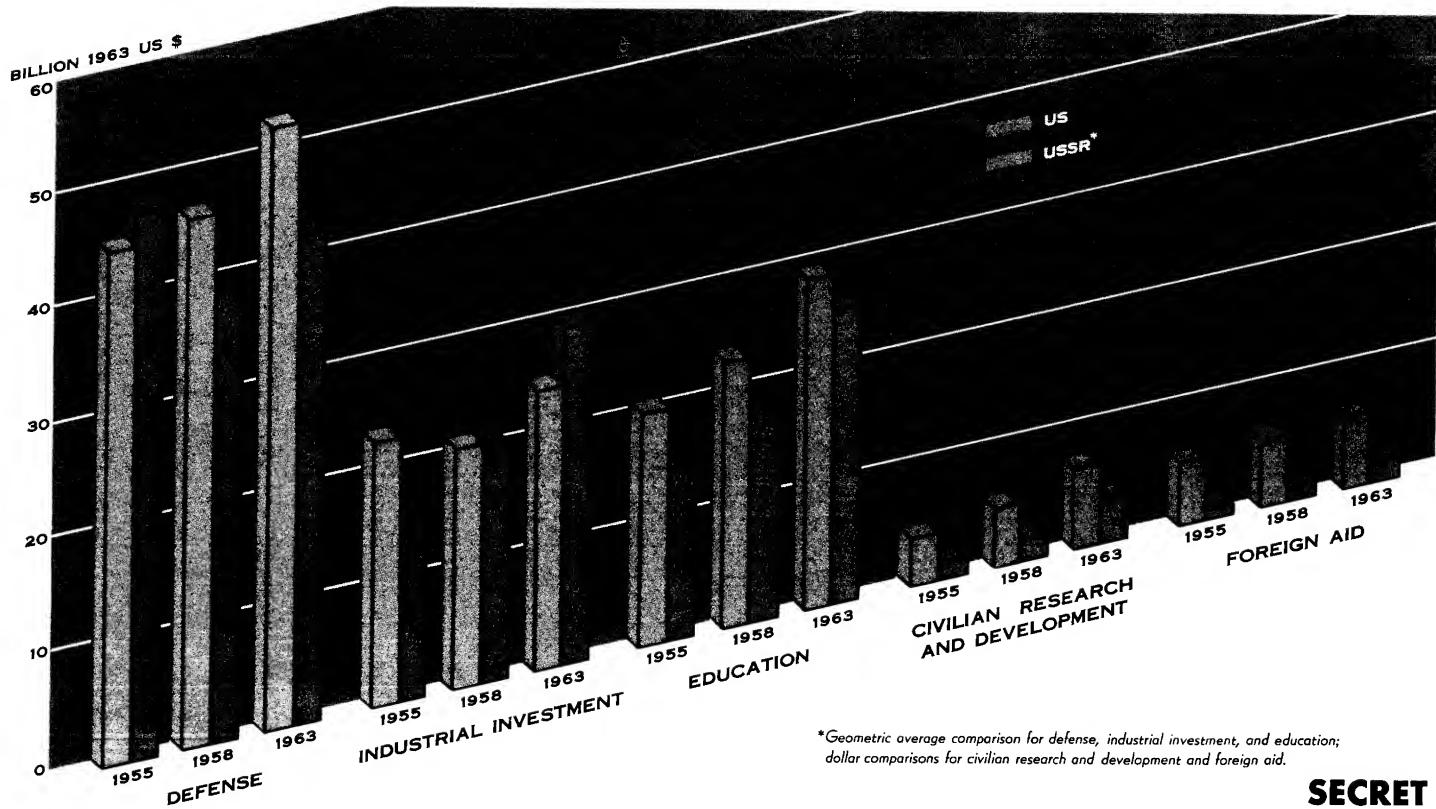
* P. 52, below.

** The detailed data needed to calculate national policy expenditures for 1964 are not available.

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**US and USSR: National Policy Expenditures
1955, 1958, and 1963**

Figure 4



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Table 3

Soviet National Policy Expenditures as a Percentage of US National Policy Expenditures
1955-63

	USSR as a Percent of US								
	1955	1956	1957	1958	1959	1960	1961	1962	1963
National policy expenditures									
Dollar comparison a/	92.2	87.4	82.9	89.8	93.0	95.3	93.8	94.9	95.2
Education									
Ruble comparison b/	53.6	55.4	58.3	55.5	58.3	61.7	64.0	68.8	70.7
Dollar comparison a/	100.5	100.0	103.3	98.3	99.2	101.6	106.1	110.6	111.4
Geometric average comparison c/	73.4	74.4	77.6	73.9	76.0	79.2	82.4	87.2	88.7
Industrial investment									
Ruble comparison b/	58.3	58.3	59.4	86.7	99.2	99.3	105.4	108.1	109.2
Dollar comparison a/	68.3	70.2	73.6	106.2	123.3	123.2	127.7	130.6	133.3
Geometric average comparison c/	63.1	64.0	66.1	96.0	110.6	110.6	116.0	118.8	120.6
Civilian research and development d/									
Dollar comparison a/	30.8	28.6	29.4	34.0	37.5	38.7	44.4	47.0	52.9
Foreign aid e/									
Dollar comparison a/	9.2	7.3	15.5	12.7	10.0	17.6	18.5	27.1	23.0
Defense									
Ruble comparison b/	96.9	91.9	80.9	82.6	82.6	85.7	80.3	79.8	79.2
Dollar comparison a/	116.0	108.1	93.2	93.7	91.7	93.8	86.3	84.4	82.5
Geometric average comparison c/	106.0	99.7	86.8	85.2	87.0	89.7	83.2	82.1	80.8

a. The dollar values of Soviet expenditures divided by the dollar values of US expenditures from Table 13, p. 52, below.
 b. The ruble values of Soviet expenditures divided by the ruble values of US expenditures from Table 13.
 c. The geometric mean of the ruble and dollar comparisons.
 d. Only the dollar comparison is presented. The ruble comparison would be the same because the Soviet-weighted and US-weighted ruble/dollar ratios used for civilian research and development are identical.
 e. Available data do not permit the making of a ruble comparison.

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Along with a large and growing investment in physical capital relative to the United States, the USSR has been devoting impressive amounts of resources to the development of its human capital. In 1963, with a GNP less than half that of the United States, the USSR spent nearly nine-tenths as much as the United States on education, including both current expenditures on wages and materials and the cost of construction of new educational facilities. As shown by the geometric average comparison, the Soviet relative position rose steadily over the period, from 73 percent of the US in 1955 to 89 percent in 1963. By the dollar comparison, Soviet expenditures on education exceeded those of the United States in both years. Expenditures on education are a much larger share of total consumption in the USSR than in the United States. In 1963 they represented 18 percent of the total in the USSR when measured in dollars, compared with 6 percent in the United States; the corresponding percentages are 7 and 3 when measured in rubles. With this investment effort the USSR raised the median number of years of schooling of its population by nearly one-half, from nearly 3.5 years in 1955 to about 5 years in 1963. The average educational attainment of the US population, however, was nearly 11.5 years in 1963.

The relative size of investment allocations by the USSR to the industrial sector of its economy increased spectacularly during 1955-63, a bit more rapidly than for investment as a whole. According to the geometric average comparison, Soviet industrial investment was 63 percent of that of the United States in 1955, but by 1958 it almost equaled that of the United States, and in 1963 it was 21 percent greater. Soviet industrial investment has exceeded US industrial investment since 1961, whether measured in rubles or in dollars. The emphasis that the USSR gives to the development of its industrial sector is shown even more strikingly by the fact that industrial investment in the USSR is twice as large a share of total investment as in the United States. Thus when measured in dollars the USSR in 1963 allocated nearly 40 percent of total investment to industry, whereas the United States devoted a little over 23 percent of the total to that sector.

In 1955, Soviet expenditures for civilian research and development were less than one-third those of the United States, but by 1963 they were a little over one-half of US expenditures. The relative size of Soviet civilian research decreased slightly in 1956 and 1957 but rose again in the period 1958-63. The US-weighted and Soviet-weighted ruble/dollar ratios for civilian research are equal, so that the comparative size of US and Soviet expenditures is the same, whether valued at dollar prices or ruble prices.

A discussion of the relative size of US and Soviet defense expenditures appears in the preceding section. With respect to foreign aid, the USSR has improved its position vis-a-vis the United States to a greater extent than for any other of the national policy expenditures, but the relative size of this component is also by far the smallest. In 1955, Soviet foreign aid was less than one-tenth as large as US

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foreign aid, but by 1963 it had increased to almost one-fourth the size of US aid. Soviet foreign aid expenditures increased greatly relative to US expenditures in 1957, declined in 1958 and 1959, rose sharply during the next three years to a peak of 27 percent in 1962, and then decreased to 23 percent in 1963. The comparison is made in dollars, because the data necessary to construct a ruble/dollar ratio for foreign aid are not available.

A whole host of qualifications attaches to the comparisons of expenditures on foreign aid in the two countries. In the first place, the estimates could be made only in current dollars, because of the lack of an appropriate price index to convert them to 1963 dollars. Dollar figures for Soviet foreign aid had to be pieced together from a variety of sources of varying reliability and do not include military aid to Communist countries. Moreover a number of "price" biases underlying the estimates weaken the reliability of the comparisons. Because Soviet list prices for military aid items are much lower than prices for comparable US equipment, particularly for aircraft and ships, a simple dollar-for-dollar comparison of US and Soviet military aid tends to underestimate the value of the latter. On the other hand, Soviet technical assistance, which represents about 15 percent of Soviet economic aid, is less efficient and relatively more costly than comparable US assistance, so that an upward and offsetting bias is introduced into the comparisons. In addition, the major part of foreign aid expenditures consists of machinery and equipment, often in the form of complete plants, for which appropriate estimates of world prices are not available. Finally some upward bias may exist on the US side because most US foreign aid is given with the provision that the recipient must spend the funds in the United States; it is possible that US prices for some goods are higher than the world prices on which Soviet aid expenditures are said to be based.

Taken as a whole, the five categories of national policy expenditures form a much larger part of total GNP in the USSR than in the United States. In dollar valuations, total national policy expenditures in 1955 were 40 percent of total GNP in the USSR and only 21 percent in the United States; in 1963 their share in Soviet GNP had dropped to 35 percent, while their share in US GNP had not changed significantly. Whereas total GNP when valued in dollars was 48 percent of US GNP in 1955, total national policy expenditures in the USSR were 92 percent of those of the United States. By 1963, Soviet GNP had risen to 55 percent of the US level in dollars, while national policy expenditures had risen to a lesser extent, to 95 percent.

D. Comparison of Present and Previous Estimates of US and Soviet Gross National Product

The comparison of US and Soviet GNP and its end uses presented in this report differs significantly from previous estimates by this

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Office. The new comparison shows the size of the Soviet economy to be smaller relative to that of the United States as measured by total GNP and each major end use except defense. The difference is attributable to two changes introduced into the new comparisons: (1) the arbitrary adjustment of certain ruble/dollar ratios for reasons explained above, and (2) the omission of expenditures for capital repair and civilian research and development previously counted in the estimates of Soviet investment; those items make up about 10 percent of total investment. Soviet expenditures for capital repair are excluded because in large part they consist of outlays for current maintenance and repair. On the other hand, it is believed that sizable amounts of capital repair are not included in investment reporting in the United States but instead are written off as current costs. Similarly, expenditures for civilian research and development are counted as costs and not as investment in US statistics. The adjustment of the ruble/dollar ratios, however, has a much greater effect on the US-Soviet comparisons than does the change in the estimate of Soviet investment.

Table 4 shows the present and previous percentage comparisons of US and Soviet GNP and its end uses for 1963; the corresponding ruble and dollar values are shown in Table 14.* The revisions in the comparisons affect only the levels and not the trends, because in the period 1955-63 civilian research and development plus capital repair did not change as a share of total Soviet investment and because the adjustment of the ruble/dollar ratios was applied uniformly to all years for lack of a more defensible alternative. With respect to total GNP the new comparison lowers the relative position of the USSR vis-a-vis the United States by one-twelfth -- from 48 percent to 44 percent in 1963 by the geometric average comparison. The relative position of the USSR for consumption as a whole is reduced by only about 1.4 percentage points, but for health and education it is significantly smaller (62 percent compared with 69 percent). As would be expected, the new comparison substantially changes the relative position of the USSR with respect to investment. Measured by the geometric average, the new comparison shows Soviet investment to be 67 percent of that of the United States, compared with 88 percent according to the previous comparison by this Office. For administration the comparison is changed proportionately to the change in the ruble/dollar ratio; Soviet administration is shown to be 70 percent of that of the United States instead of 85 percent.

* P. 55, below. The data to calculate a "previous" comparison for 1964 are not available in the necessary detail. It is clear, however, that the differences between the new and old comparisons would be about the same in 1964 and are shown in Tables 4 and 14 for 1963.

Table 4

Comparison of Present and Previous Estimates of Soviet Gross National Product
as a Percentage of US Gross National Product a/
1963

USSR as a Percent of US

	Previous Comparisons			Present Comparisons		
	Ruble Comparison	Dollar Comparison	Geometric Average	Ruble Comparison	Dollar Comparison	Geometric Average
Gross national product	38.1	61.6	48.4	35.8	55.3	44.5
Consumption	30.1	47.6	37.9	29.4	45.3	36.5
Household consumption	29.1	38.0	33.3	28.5	37.9	32.9
Food	53.7	79.9	65.5	53.7	79.9	65.5
Nonfood goods	16.9	17.7	17.3	16.2	17.5	16.8
Consumer services	15.9	29.2	21.5	15.9	29.2	21.5
Health and education	43.4	109.6	69.0	41.8	93.0	62.3
Investment	77.8	100.6	88.5	58.7	76.1	66.8
Fixed investment	72.6	95.1	83.1	60.5	79.4	69.3
Machinery and equipment	78.5	141.7	105.5	65.4	118.1	87.9
Construction	69.7	71.0	70.3	58.0	59.2	58.6
Inventories	100.0	115.2	107.3	100.0	115.2	107.3
Defense	79.2	82.5	80.8	79.2	82.5	80.8
Administration	85.0	84.2	84.6	70.1	70.1	70.1

a. Calculated from data in Tables 7, 8, 10, 11, and 14, pp. 44, 45, 49, 50, and 55, respectively, below. Ruble comparisons are based on 1955 rubles and dollar comparisons on 1963 dollars.

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APPENDIX A

DERIVATION OF BASIC RUBLE/DOLLAR RATIOSA. Consumption*

The 1955 ruble/1955 dollar ratios for consumption were derived from a comparison of US and Soviet prices for a sample of 152 items, including 48 food items, 76 nonfood items, 25 services (excluding health and education), and 3 health and education services. Although the sample is quite representative of the product mix in both countries with respect to major product groups, it is less satisfactory within subgroups such as meat, poultry, clothing, and household appliances; in addition, many products important in one country are not found at all in the other country. With respect to health and education services, for which no suitable measure of output can be calculated, the ruble/dollar ratio was computed on the basis of the prices of inputs (wages of workers and the cost of materials purchased). The ruble/dollar ratios calculated for individual products and services were then grouped into four sub-components (food, nonfood goods, consumer services, and health and education), and average ruble/dollar ratios for each subcomponent were calculated by weighting the individual ratios by the shares of the sub-components in total GNP in the United States and the USSR, respectively. The 1955 ruble/1955 dollar ratios for the four subcomponents were converted to 1955 ruble/1963 dollar ratios with the use of appropriate price indexes available from published and unpublished data of the Department of Commerce. These indexes are those implicit in data series given in current and in constant dollars.**

B. Investment

Separate calculations were made of the 1955 ruble/1955 dollar ratios for three broad categories of investment -- machinery and equipment, construction, and inventories. The ratios for machinery and equipment*** are based on a study [redacted] comparing 1955 wholesale prices of more than 500 producer durables in the United States and the USSR. The ruble/dollar ratios for these individual items were grouped into several product categories (for example, agricultural machinery,

25X1

25X1

** For details and sources for these and all other price indexes used to convert the 1955 ruble/1955 dollar ratios to 1955 ruble/1963 dollar ratios, see the footnotes to Table 9, p. 47, below.

25X1

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trucks and buses, and railroad equipment) and average ratios were computed for each category, using as weights the value of sales in each country. The product categories were then grouped into four broad sectoral categories (agriculture, industry, transportation and communications, and other), and appropriate US-weighted and Soviet-weighted ratios were selected for each sector by inspection of the array of ratios for the product categories. Finally, the sectoral ratios, weighted by their shares in the total value of the machinery and equipment component of investment in the United States and in the USSR, were averaged to obtain the overall ratios for machinery and equipment. These 1955 price ratios were then converted to 1955 ruble/1963 dollar ratios by dividing them by an appropriate price index published by the Council of Economic Advisers.

The ratios for construction* are based on a comparison of the cost of 25 Soviet construction projects in 1955 ruble prices with the cost in 1955 dollar prices of 25 comparable construction projects in the United States. The size and composition of the sample of projects were limited chiefly by the data available on Soviet construction, and, as a result, the projects compared are more representative of construction in the USSR than in the United States. The unweighted ratios for the 25 pairs of projects show a strong central tendency for such a small sample, however. To obtain the overall ratios for construction, the 25 projects were first grouped into five categories (housing, industrial construction, highway construction, transportation and communications facilities -- except highways -- and commercial and all other construction), and average ratios for each category were obtained by weighting the individual ratios by their shares in the total value of construction in that category in the United States and in the USSR. The ratios for the five categories were then weighted by their shares in the total value of construction in the two countries to obtain the 1955 ratios for construction as a whole. These ratios were then converted to 1955 ruble/1963 dollar ratios by dividing them by the price index for construction implicit in data published by the Department of Commerce.

The 1955 ratios for inventories, which include both manufacturing and retail trade, were derived generally as follows: (1) separate calculations were made for manufacturing and for retail trade; (2) to the extent possible with available information, the total value of inventories in each of these categories was distributed among some six to eight product groups (for example, food products, chemicals, and building materials), and a ruble/dollar ratio available from the detailed calculation of the ratios for consumption and investment was assigned to each group; (3) to obtain the average ratios for manufacturing inventories, the product group ratios were aggregated.

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in two stages, using as weights, insofar as possible, the additions to inventories in 1955 in that group in each country; a similar procedure was used to obtain the average ratios for retail trade; (4) the ratios for inventories as a whole are the averages of the ratios for manufacturing and retail trade, weighted by their respective shares in the total inventory addition in 1955 in each country. Appropriate price indexes published by the Council of Economic Advisers were used to convert the 1955 ratios to 1955 ruble/1963 dollar ratios.

C. Defense

The procedure used to obtain the ruble/dollar ratios for defense differs from that used to obtain the ratios for the other end uses of GNP. The ratios for defense were derived as a byproduct of the methods used to estimate Soviet defense expenditures in rubles and in dollars. In contrast to the method used for the other end uses, total defense expenditures in the USSR were calculated directly in rubles and in dollars for each year. In deriving ruble values for Soviet defense expenditures, known or estimated ruble prices were applied to the physical estimates summarizing available information on the components of the total military structure. For example, a significant amount of information is available on the Soviet military pay system, which was applied to estimates of the Soviet order of battle to obtain estimates of personnel costs. Similar calculations were made for military procurement, facilities, and other major expenditure categories. For most military equipment, however, Soviet prices are not known, and the prices for these items had to be estimated in dollar cost and then converted to rubles by estimated ruble/dollar ratios for individual items. The dollar valuation of Soviet military programs was made by applying estimated dollar costs to the Soviet programs at the same level of detail and in the same manner as for the ruble valuations. In estimating the dollar cost, the guiding objective was to determine what it would cost to reproduce a given Soviet program in the United States -- for example, the cost of producing a Soviet T-54 tank in the United States was estimated, and not the dollar price of a comparable US tank. Some fifty major expenditure categories were considered in compiling the ruble and dollar valuations of Soviet military programs, and about a dozen widely varying ruble/dollar ratios are implicit in these calculations.

The results of these calculations were a series of estimates of Soviet defense expenditures for each year in 1955 rubles and in 1963 dollars. The resulting aggregate ruble/dollar ratio for defense increases from year to year because of the changing mix of defense activities. The Soviet mix has been shifting steadily from relatively cheap (in rubles) manpower to relatively expensive advanced weapons.

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To calculate US expenditures a similar effort was undertaken but in much less detail because of the absence of the required data. US defense expenditures in 1963 dollars were divided into 10 major categories, and these categories were converted to rubles by appropriate ruble/dollar ratios obtained in the calculation of Soviet defense outlays described above. Thus the conversion of US expenditures each year to rubles reflects the US mix of major categories of defense but not the detailed US mix within each category. On this account the ruble value of US defense may be somewhat understated.

D. Administration

The ruble/dollar ratio for administration was derived as the ratio of average annual earnings of persons employed in government administration in the two countries. In the USSR the average earnings are those of all Soviet employees in the organs of state and economic administration, in the administrative organs of social and cooperative organizations, and in communal economy. In the United States the average annual earnings are those of federal, state, and local government civilian employees (excluding education). Inasmuch as the ruble/dollar ratio for administration is based on this single comparison, the Soviet-weighted and US-weighted ratios are identical. The 1955 ratio was converted to a 1955 ruble/1963 dollar ratio by dividing by an index of average annual earnings of government employees published by the Department of Commerce.

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APPENDIX B

STATISTICAL TABLES

Table 5

US: Derivation of Gross National Product, by End Use, in Current Dollars
1955-64

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Million US \$
I. Consumption											
1. Personal consumption expenditures a/*	256,940	269,917	285,164	293,495	313,835	328,232	337,347	356,347	374,959		
2. Federal purchases of goods and services for education b/	117	115	108	151	247	269	265	339	354		
3. Federal purchases of goods and services for veterans' education, training, and other benefits b/	13	8	9	11	5	7	9	7	8		
4. State and local purchases of goods and services for education b/	11,317	12,340	13,386	15,097	16,285	17,661	19,515	20,551	22,186		
5. Total public education (the sum of items 2, 3, and 4)	11,447	12,463	13,503	15,259	16,537	17,937	19,789	20,897	22,548		
6. Less new public construction for education c/	2,442	2,556	2,825	2,875	2,646	2,818	3,052	2,984	3,043		
7. Less estimated equipment purchases for education d/	404	481	388	408	457	480	527	576	(600)		
8. Public education expenditures -- non-investment (item 5 minus the sum of items 6 and 7)	8,601	9,426	10,290	11,976	13,434	14,639	16,210	17,337	18,905		
9. Federal purchases of goods and services for public health and sanitation b/	127	206	220	250	337	317	370	555	551		
10. Federal purchases of goods and services for veterans' hospitals and medical care b/	760	791	813	887	933	986	1,051	1,092	1,169		
11. State and local purchases of goods and services for public health and sanitation b/	3,683	4,076	4,605	4,932	5,291	5,578	5,877	6,234	6,743		
12. Total public health and sanitation (the sum of items 9, 10, and 11)	4,570	5,073	5,638	6,069	6,561	6,881	7,298	7,881	8,463		
13. Less new public construction for hospitals and institutions c/	322	300	354	390	427	400	369	397	454		
14. Less new public construction of sewer and water systems c/	1,085	1,275	1,344	1,387	1,462	1,487	1,581	1,754	1,966		
15. Less estimated equipment purchases for health and hospitals e/	(32)	(30)	(35)	(39)	(43)	40	52	58	(67)		
16. Less estimated equipment purchases for sewers and sanitation e/	(22)	(26)	(27)	(28)	(29)	29	35	41	(48)		
17. Public health and sanitation expenditures -- noninvestment (item 12 minus the sum of items 13 through 16)	3,109	3,442	3,878	4,225	4,600	4,925	5,261	5,631	5,928		
18. Total consumption (the sum of items 1, 8, and 17)	268,650	282,785	299,332	309,399	331,572	347,796	358,818	379,722	399,792	425,500 f/	

* Footnotes follow on p. 41.

Table 5

US: Derivation of Gross National Product, by End Use, in Current Dollars .
 1955-64
 (Continued)

	Million US \$									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
II. Investment										
1. Gross private domestic investment g/	63,843	67,366	66,125	56,641	72,726	71,757	68,766	79,126	82,001	
2. New public construction activity g/	11,961	12,712	14,017	15,157	16,107	15,953	17,148	17,758	18,679	
3. Less military facilities h/	1,313	1,360	1,287	1,402	1,441	1,386	1,378	1,269	1,560	
4. New public construction other than military (item 2 minus item 3)	10,648	11,352	12,730	14,055	14,666	14,567	15,770	16,489	17,119	
5. Equipment purchased by government for other than defense i/	1,173	1,252	1,293	1,294	1,354	1,543	1,732	1,904	(2,000)	
6. Defense stockpiling and defense production facilities h/	658	458	567	535	203	57	142	225	118	
7. State and local atomic energy development b/	65	82	104	124	146	175	207	227	247	
8. Federal purchase of goods and services for foreign economic assistance and other transfers b/	348	376	319	315	250	298	422	438	452	
9. Military assistance j/	2,325	2,579	2,435	2,281	1,974	1,765	1,465	1,539	1,632	
10. Net exports of goods and services j/	1,094	2,930	4,944	1,249	-759	2,996	4,592	4,000	4,399	
11. Total investment (item 1 plus the sum of items 4 through 10)	80,154	86,395	88,517	76,494	90,560	93,158	93,096	103,948	107,968	117,100 f/
III. Defense										
1. Purchases of goods and services for defense b/	39,232	40,532	44,612	45,061	46,484	45,965	49,312	53,919	55,560	
2. Less defense stockpiling and defense facilities h/	658	458	567	535	203	57	142	225	118	
3. Less military assistance j/	2,325	2,579	2,435	2,281	1,974	1,765	1,465	1,539	1,632	
4. Less state and local atomic energy development b/	65	82	104	124	146	175	207	227	247	
5. Less government sales b/	358	331	422	498	479	580	589	879	828	
6. Total defense (item 1 minus the sum of items 2 through 5)	35,826	37,082	41,084	41,623	43,682	43,388	46,909	51,049	52,735	53,400 f/
IV. Administration										
1. Government purchases of goods and services minus government sales g/	75,950	79,298	86,958	93,956	97,678	100,196	108,540	117,198	123,387	
2. Less purchases of goods and services for defense b/	39,232	40,532	44,612	45,061	46,484	45,965	49,312	53,919	55,560	
3. Less new public construction other than military k/	10,648	11,352	12,730	14,055	14,666	14,567	15,770	16,489	17,119	
4. Less equipment purchased by government for other than defense i/	1,173	1,252	1,293	1,294	1,354	1,543	1,732	1,904	(2,000)	
5. Less public education expenditures -- noninvestment m/	8,601	9,426	10,290	11,976	13,434	14,639	16,210	17,337	18,905	

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Table 5
(Continued)

6. Less public health and sanitation expenditures -- noninvestment ^{n/}	3,109	3,442	3,878	4,225	4,600	4,925	5,261	5,631	5,928
7. Less foreign economic assistance and other transfers ^{o/}	348	376	319	315	250	298	422	438	452
8. Total administration (item 1 minus the sum of items 2 through 7)	12,839	12,918	13,836	17,030	16,890	18,259	19,833	21,480	23,423
Total gross national product	397,469	419,180	442,769	444,546	482,704	502,601	518,656	556,199	583,918
									622,000 ^{f/}

a. Source ^{18/}, Table II-4; source ^{19/}, Table 14, and source ^{20/}, Table 14. Estimated data are shown in parentheses.

b. ^{21/}

c. ^{22/}

d. Estimate of this Office based primarily on data from source ^{23/}.

e. The estimates of state and local expenditures on equipment for sewers and sanitation and for "health and hospitals" for the years 1960-63 were obtained from unpublished data from the Bureau of the Census. The data were converted from a fiscal year to a calendar year basis by combining half of the current fiscal year's figure with half of the figure for the succeeding fiscal year. For 1963, half of the fiscal year figures was combined with half of the estimated figure for fiscal 1964 based on the year-to-year increase in these figures over the preceding 10 years. The 1955 estimates of equipment purchases for health and hospitals for the years 1955-59 were derived by taking 10 percent of the figures for hospital and institutional public construction for these years. Estimates of equipment purchases for sewers and sanitation were obtained by taking 2 percent of the figures for public construction of sewer and water systems for these years. These percentages are based on the approximate ratios of equipment purchases to construction expenditures for health and sanitation in 1960-63.

f. The estimates for 1964 were derived in the same way as for previous years, using data in source ^{24/}. The derivation of consumption and investment is shown in detail in Table 6. The value for defense equals total federal purchases of goods and services for national defense, plus estimated expenditures of state and local governments (except for atomic energy development) of \$0.1 billion, less expenditures of \$0.1 billion and \$1.3 billion for stockpiling and military assistance, less estimated government sales of \$0.8 billion. The value for administration equals total government purchases of goods and services less those allocated to health and education, investment, and defense.

g. ^{25/}

h. ^{26/}

i. Estimate of this Office based on data given on a fiscal-year basis in source ^{27/}. The figures were then converted to a calendar-year basis by combining half of the current fiscal-year figure for equipment expenditures with half of the succeeding fiscal-year figure for the years 1955-62. For 1963, half of the fiscal-1963 figure was combined with half of an estimated figure for fiscal 1964 based on the yearly increase in these figures over the preceding 10 years.

j. ^{28/}

k. See II, 4, above.

l. See II, 5, above.

m. See I, 8, above.

n. See I, 17, above.

o. See II, 8, above.

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Table 6

US: Derivation of Major Subcomponents of Consumption and Investment in Current Dollars
1955-64

	Million US \$									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964 a/
Consumption	268,650	282,785	299,322	309,399	331,572	347,796	358,818	379,722	399,792	425,500
Household consumption b/	241,516	252,888	266,515	272,912	291,267	304,280	311,918	329,334	345,673	367,400
Food	67,942	71,234	74,324	76,599	77,679	79,500	81,262	84,597	87,097	91,600
Nonfood goods	88,497	90,171	94,737	93,038	103,293	107,175	107,556	115,063	121,351	131,200
Consumer services	85,077	91,483	97,454	103,275	110,295	117,605	123,100	129,674	137,225	144,600
Health and education c/	27,134	29,897	32,817	36,487	40,305	43,516	46,900	50,388	54,119	58,100
Investment	80,154	86,395	88,517	76,494	90,560	93,158	93,096	103,948	107,968	117,100
Fixed investment	70,096	75,532	78,941	74,471	82,481	84,574	84,641	91,896	96,917	104,500
Machinery and equipment d/	24,318	28,482	29,836	24,451	27,347	29,174	27,730	31,038	33,105	37,400
Construction e/	45,778	47,050	49,105	50,020	55,134	55,400	56,911	60,858	63,812	67,100
Inventories f/	6,291	4,978	1,878	-1,822	6,614	3,525	1,976	6,075	4,568	3,800
Other investment g/	3,767	5,885	7,698	3,845	1,465	5,059	6,479	5,977	6,483	8,800

a. The estimates for 1964 were derived in the same way as for previous years, based on data in source 29/.

b. Personal consumption expenditures as presented in the Department of Commerce Table II-4 (other than those for health and education) have been allocated among the following components of household consumption:

Household Consumption Component	Allocation of Categories, by Line, Presented in Table II-4 30/
Food (excluding tobacco)	I (1.) through I (4.)
Nonfood goods	I (5.), II (1.), II (3.), II (4.), II (7.), III (1.), V (1.) through V (7.), VIII (1a.), VIII (1b.), VIII (1d.), IX (1.) through IX (5.), IX (7.)
Consumer services	II (2.), II (5.), II (6.), II (8.), III (2.), IV, V (8.) through V (11.), VI (8.), VII, VII (1c.), VIII (1e.), VIII (1f.), VIII (2.), VIII (3.), IX (6.), IX (8.) through IX (12.), XI, XII

c. Health and education expenditures include the following categories of personal consumption expenditures from Table II-4 of the National Income and Product Tables: VI (1.) through VI (7.) (expenditures for medical care) and X (private education and research) 31/ as well as the noninvestment public expenditures for education and health and sanitation (lines I (8.) and I (17.) from Table 5).

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Table 6
(Continued)

d. Expenditures on machinery and equipment include gross private domestic investment in producers' durable equipment, an estimated share of equipment purchases in state and local purchases of goods and services for atomic energy development, ^{32/} and other government purchases of equipment for civilian purposes (line II (5.) from Table 5). State and local government expenditures on atomic energy development are allocated arbitrarily between equipment and construction according to the relation of producers' durable equipment and construction in gross private domestic investment.

e. Construction includes total new construction activity, both public and private, less construction of military facilities, the estimated construction component of state and local expenditures on atomic energy development (see footnote d, above), and federal government purchases of defense production facilities. ^{33/}

f. The inventories component of investment includes the change in business inventories and the net acquisition by the federal government of strategic materials. ^{34/}

g. Lines II (8.) through II (10.) from Table 5.

Table 7

US: Gross National Product, by End Use, in 1963 Dollars a/
1955-64

	Billion 1963 US \$									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Consumption b/	307.4	322.6	327.0	331.2	349.6	363.5	368.1	386.0	399.8	420.3
Household consumption b/	271.8	284.5	287.0	288.4	304.1	315.9	318.8	334.2	345.7	363.4
Food	75.7	78.8	79.7	79.3	81.4	82.6	83.4	85.9	87.1	90.7
Nonfood goods	95.9	96.1	98.2	96.0	105.2	108.0	108.6	116.1	121.4	130.4
Consumer services	100.2	109.6	109.1	113.1	117.5	125.2	126.8	132.2	137.2	142.3
Health and education	35.6	38.1	40.0	42.7	45.5	47.6	49.3	51.8	54.1	56.9
Investment b/	94.9	96.4	94.6	81.0	96.3	95.8	95.3	105.3	108.0	115.3
Fixed investment b/	83.5	84.5	84.4	78.7	88.1	87.0	86.7	93.1	96.9	102.5
Machinery and equipment	28.7	31.6	31.2	24.9	27.3	29.1	27.7	31.1	33.1	37.1
Construction	54.8	52.8	53.1	53.8	60.8	58.0	59.0	62.0	63.8	65.4
Inventories	7.0	5.4	2.0	-1.9	6.7	3.6	2.0	6.1	4.6	3.6
Other c/	4.4	6.6	8.3	4.2	1.5	5.1	6.6	6.1	6.5	9.2
Defense	45.1	44.3	46.9	46.1	46.9	45.3	48.1	52.5	52.7	50.9
Administration	18.3	17.7	18.3	21.1	20.3	21.0	21.9	22.7	23.4	25.5
Total gross national product b/	465.8	481.0	486.8	479.4	513.1	525.6	533.3	566.5	583.9	612.0

a. End-use components in 1963 dollars were derived by deflating the components shown in current dollars in Table 6. The deflators are based on Department of Commerce data, and the deflators for 1955 are explained in the footnotes to Table 9. Deflators for 1956-62 and 1964 were derived in the same way from the same Department of Commerce sources.

b. Because of rounding, components may not add to the totals shown.

c. Net foreign investment, military assistance, and defense stockpiling.

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Table 8

USSR: Gross National Product, by End Use, in 1955 Rubles a/
1955-64

	Billion 1955 Rubles									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Consumption	89.8	95.5	101.5	106.6	112.3	117.5	122.0	128.3	131.0	136.6
Household consumption	81.6	86.8	92.3	96.9	102.2	106.7	110.5	116.2	118.2	123.0
Food	54.3	57.3	61.1	63.0	65.5	67.2	69.2	72.5	73.2	76.1
Nonfood goods	21.7	23.5	24.7	26.9	29.1	31.3	32.6	34.3	35.0	36.2
Consumer services	5.6	6.0	6.5	7.0	7.6	8.2	8.7	9.4	10.0	10.7
Health and education	8.2	8.7	9.2	9.7	10.1	10.8	11.5	12.1	12.8	13.6
Wages	5.2	5.3	5.5	5.8	6.0	6.4	6.8	7.3	7.6	8.0
Materials	3.0	3.4	3.7	3.9	4.1	4.4	4.7	4.8	5.2	5.6
Investment	22.1	26.3	30.3	35.0	39.1	39.2	42.5	44.5	46.1	51.6
Fixed investment	19.9	23.0	25.9	30.1	34.0	36.7	38.4	40.3	42.4	46.2
Machinery and equipment	6.2	7.7	8.5	9.9	10.7	11.4	12.7	14.1	15.3	17.2
Construction b/	13.7	15.3	17.4	20.2	23.3	25.3	25.7	26.2	27.1	29.0
Inventories	2.2	3.3	4.4	4.9	5.1	2.5	4.1	4.2	3.7	5.4
Defense	15.6	14.8	14.0	14.3	14.7	15.0	15.1	16.6	16.8	16.7
Administration	2.9	3.0	3.0	3.0	3.0	3.1	3.3	3.4	3.4	3.5
Total gross national product by end use	130.4	139.6	148.8	158.9	169.1	174.8	182.9	192.8	197.3	208.4
Statistical discrepancy c/	0	1.6	-0.9	2.9	-0.9	1.2	3.8	0.7	-0.5	1.9
Total gross national product	130.4	141.2	147.9	161.8	168.2	176.0	186.7	193.5	196.8	210.3

a. The methods and sources used to estimate Soviet gross national product (GNP) in 1955 are as presented [redacted]. Although the calculations shown in this 1958 publication have been revised to incorporate later data, the general nature of the methods and sources remains the same. The largest revisions are in consumption, and these are presented [redacted]. For succeeding years the values of the separate components are derived by moving base-year values forward by volume indexes with 1955 weights. The defense component is calculated separately for each year in 1955 prices. The value of expenditures for government administration in 1955 is moved forward by an index of employment in state and economic administrative organs, cooperative and public organizations, and municipal government.

b. Construction includes associated costs such as design activity and administrative overhead costs.

c. The statistical discrepancy is the difference between total gross national product by end use and total gross national product by industry of origin (see p. 12, above).

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Table 9

US and USSR: Derivation of 1955 Ruble/1963 Dollar Ratios

	Soviet Weights					US Weights			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Basic 1955 Dollar/ 1955 Ruble Ratios <u>(1955 = 100) a/</u>	US Price Index, 1963	Basic 1963 Dollar/ 1955 Ruble Ratios b/	Adjusted 1963 Dollar/ 1955 Ruble Ratios c/	Adjusted 1955 Ruble/ 1963 Dollar Ratios d/	Basic 1955 Ruble/ 1955 Dollar Ratios	US Price Index, 1963 <u>(1955 = 100) e/</u>	Basic 1955 Ruble/ 1963 Dollar Ratios f/	Adjusted 1955 Ruble/ 1963 Dollar Ratios g/
Components of gross national product									
Consumption									
Food	0.853 g/	111.5	0.951	0.951	1.052	1.746 h/	111.5	1.566	1.566
Nonfood goods	0.568 g/	108.3	0.615	0.609	1.642	1.842 h/	108.3	1.701	1.776
Consumer services	3.405 g/	117.8	4.011	4.011	0.249	0.539 h/	117.8	0.458	0.458
Health and education									
Wages	4.862 i/	146.4	7.118	5.932	0.169	0.720 j/	131.9	0.546	0.566
Materials	0.901 k/	111.1	1.001	1.001	0.999				
Investment									
Machinery and equipment	2.598 l/	118.0	3.066	2.555	0.391	0.696 m/	118.0	0.590	0.708
Construction	1.399 n/	119.6	1.673	1.394	0.717	0.730 o/	119.6	0.610	0.732
Inventories	1.281 p/	111.6	1.430	1.430	0.699	0.900 q/	111.6	0.806	0.806
Defense q/									
Administration	4.050 r/	142.8	5.783	4.819	0.208	0.247 s/	142.8	0.173	0.208
Components of national policy expenditures									
Education									
Wages	4.258 t/	150.0	6.387	5.322	0.188	0.572 u/	140.4	0.407	0.435
Materials	0.901 v/	111.1	1.001	1.001	0.999	0.700 w/	128.1	0.546	0.655
Investment	1.428 y/	128.1	1.829	1.524	0.656				
Industrial investment									
Machinery and equipment	3.136 z/	118.0	3.700	3.083	0.324	0.446 y/	118.0	0.378	0.454
Construction	1.355 z/	125.7	1.703	1.419	0.705	0.731 aa/	125.7	0.582	0.698
Civilian research and development	N.A.	N.A.	2.326 bb/	2.326	0.430	N.A.	N.A.	0.430 bb/	0.430
Foreign aid cc/	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Table 9
(Continued)

a. The price indexes measuring the change in prices in the United States between 1955 and 1963 are based on the following sources:

1. Food -- implicit price deflator for foods and beverages, 1963/1955. 37/
2. Nonfood -- average of implicit price deflators, 1963/1955, for consumer expenditures on nondurables excluding foods and beverages and on durable goods, using 1955 expenditures as weights. 38/
3. Consumer services -- implicit price deflator for all services, 1963/1955. 39/
4. Health and education wages -- average of indexes of average annual earnings in health and education, 1963/1955. The index of earnings in health was estimated to be 1.395 based on the change in average earnings in medical and other health services. The index of earnings in education was estimated to be 1.50 based on the change in average annual earnings in public education and educational services, not elsewhere classified. 40/ These two indexes were then combined using Soviet expenditures on wages in health and education in 1955 as weights. These weights are discussed in footnote 1, below.
5. Health and education materials purchases -- the implicit price deflator for nondurable goods, 1963/1955.
6. Machinery and equipment -- the implicit price deflator for producers' durable equipment, 1963/1955. 41/
7. Construction -- the implicit price deflator for new construction activity, 1963/1955. 42/
8. Inventories -- the unweighted average of implicit price deflators for durable goods, nondurable goods, and producers' durable equipment. 43/
9. Administration -- the change in average annual earnings of full-time civilian employees of the federal government and of nonschool employees of state and local governments, 1963/1955. 44/
10. Wages in education -- see 4, above.
11. Materials purchases for education -- see 5, above.
12. Investment in education -- the implicit price deflator for new public investment activity -- nonresidential buildings, 1963/1955. 45/
13. Industrial investment - machinery and equipment -- see 6, above.
14. Industrial investment - construction -- the implicit price deflator, 1963/1955, is derived by weighting the implicit price deflators, 1963/1955, for private nonresidential, nonfarm construction (128.4), private public utilities construction (125.1), and petroleum and natural gas drilling (118.3) by the value of expenditures for these categories of construction in 1955. 46/

b. Column 1 inflated by the respective price index in column 2, except where otherwise indicated.

c. Soviet-weighted dollar/ruble ratios (or US-weighted ruble/dollar ratios) for (1) health and education wages, (2) machinery and equipment, (3) construction, (4) administration, (5) education wages, (6) education investment, and (7) industrial investment in machinery and equipment and in construction were divided (multiplied) by a factor of 1.20, for reasons discussed above (pp. 14-18). The dollar/ruble (ruble/dollar) ratio for nonfood goods was adjusted to reflect the division (multiplication) by 1.20 of the dollar/ruble (ruble/dollar) ratios for radio and television equipment, electrical and other appliances, and automobiles. 47/

d. The reciprocal of values in column 4.

e. The price indexes in column 7 are the same as those in column 2 with the exception of those for health and education and for the wages and materials components of education (as a component of national policy expenditures). For the derivation of the indexes that are the same, see footnote a, above. The price index for health and education is an average of the price indexes, 1963/55, for wages in health (1.395), wages in education (1.50), and materials purchases in education (1.111). The derivation of these indexes is explained in footnote a, above. The separate indexes are weighted by US expenditures on these categories in 1955 -- \$8.435 billion, \$8.292 billion, and \$10.407 billion, respectively. For the derivation of these weights, see footnote j, below. The price index for wages and materials purchases in education is an average of the price indexes for wages in education (1.50) and materials purchases in education (1.111). The indexes are weighted by US expenditures on these categories in 1955 -- \$8.435 billion and \$2.763 billion, respectively. For the derivation of the weights, see footnote t, below.

f. Column 6 deflated by the respective price index in column 7, except where otherwise indicated.

g. Soviet expenditures in 1955 in dollars on food products, nonfood products, and consumer services divided by these expenditures in rubles. 48/

h. US expenditures in 1955 on food products, nonfood products, and consumer services in rubles divided by these expenditures in dollars. 49/

i. An average of ratios of average annual earnings in the United States to average annual earnings in the USSR in 1955 in higher education (2.642), in primary and secondary education (4.742), and in health (6.060). 50/ The individual ratios were weighted by the relative size of total wages in each category. 51/ Wages in education are allocated between primary-secondary education and higher education according to the relation shown in source 52/. The 1955 ruble/1955 dollar ratio is an average of the ratios of average annual earnings in the USSR to average annual earnings in the United States in 1955 in higher education (0.379), primary and secondary education (0.211), and health (0.165) and the US-weighted ruble/dollar ratio for materials purchases (1.540). 53/ These ratios are weighted by the value of expenditures on these categories in 1955. Total education wages in 1955 (\$8.435 billion) were allocated between primary-secondary and higher education as estimated in source 54/. Finally, the value of materials expenditures on health and education was taken as the difference between total expenditures on health and education and expenditures on wages. Total expenditures are estimated at \$27.134 billion (see Table 6), while expenditures on wages as derived above were \$16.727 billion.

k. 55/

Table 9

US and USSR: Derivation of 1955 Ruble/1963 Dollar Ratios
(Continued)

l. The weighted average of 1955 dollar/1955 ruble ratios for components of investment in machinery and equipment. The individual 1955 dollar/1 July 1955 ruble ratios are presented in source ^{26/}. They were weighted by the ruble expenditures reported for 1955 by the USSR Central Statistical Administration. ^{57/} The overall ratio of 2.899 was then converted to an average 1955 dollar/1955 ruble ratio by dividing the ratio by a factor of 1.116, the average of pre-1 July 1955 prices and 1 July 1955 prices for machinery and equipment. ^{58/}

m. The ratio of US expenditures on machinery and equipment in 1 July 1955 rubles to those expenditures in 1955 dollars is estimated as 0.624. ^{59/} This was converted to an average 1955 ruble/1955 dollar ratio by multiplying by a factor of 1.116 (see footnote l, above).

n. The average 1955 dollar/1 July 1955 ruble ratio with Soviet weights is 1.441. ^{60/} This ratio was converted to an average 1955 dollar/1955 ruble ratio by dividing by a factor of 1.030, the average of pre-1 July 1955 prices and 1 July 1955 prices for construction-installation work. ^{61/}

o. The 1 July 1955 ruble/1955 dollar ratio for construction with US weights is estimated to be 0.709. ^{62/} This ratio was converted to an average 1955 ruble/dollar ratio by multiplying by a factor of 1.030 (see footnote n, above).

p. Unpublished estimates of this Office based on ruble/dollar ratios for consumer goods, industrial materials, and machinery and equipment, using Soviet (US) weights.

q. Soviet defense was priced item by item in dollar prices and in ruble prices in some detail (see Tables 8 and 11). US defense was also priced in rubles by applying ruble/dollar ratios estimated for various categories of expenditures (see Table 10). The resulting ruble/dollar ratios, based on Soviet and US weights, change from year to year and are shown in Table 12.

r. Average annual earnings of government employees (except in the military and education) in the United States (USSR) in 1955 divided by an estimate of average annual earnings of a comparable group of employees in the USSR (United States) were used as the dollar/ruble (ruble/dollar) ratio for administration. The average annual earnings of federal (civilian) and state and local nonschool employees in 1955 were \$3,675. ^{63/} In the USSR, employment in administration, comparable to that in the United States, is found in two employment categories -- administration and housing-communal economy. To derive the average annual earnings of these employees it was assumed that the average annual earnings of workers in administration are equal to average annual earnings in industry (1,031 rubles). ^{64/} The average annual earnings of workers and employees in the housing-communal economy are estimated to be 667 rubles. ^{65/} The average annual earnings of these two groups were averaged by weighting the first group by total employment in administration in 1955 (1.361 million) and the second group by half of total employment in the housing-communal economy in 1955 (0.700 million). The weighted average is 907 rubles.

s. The weighted average of dollar/ruble ratios in higher and primary-secondary education (see footnote i, above).

t. The unadjusted 1955 ruble/1955 dollar ratio for current expenditures on education is an average of the US-weighted ratios for wages in higher education (0.379), wages in primary-secondary education (0.211), and materials purchases (1.540) (see footnote j, above). The weights are the expenditures on these categories in 1955 -- \$6,200 billion for wages in primary-secondary education, \$2.235 billion for wages in higher education, and \$2.763 billion for materials purchases. Weights for the first two categories are sourced in footnote j, above; the weight for materials purchases is the difference between total current expenditures on education (\$11.198 billion) and the sum of the wages components.

u. ^{66/}

v. The Soviet-weighted 1955 dollar/1 July 1955 ruble ratio for construction of trade, communal, and other facilities: (1.471) ^{67/} was divided by a factor of 1.030 (see footnote n, above).

w. The US-weighted 1 July 1955 ruble/1955 dollar ratio for construction of commercial and all other facilities (0.680), ^{68/} multiplied by 1.030 to convert it to an average 1955 ruble/1955 dollar ratio (see footnote n, above).

x. The Soviet-weighted 1955 dollar/1 July 1955 ruble ratio for industrial machinery and equipment is estimated to be 3.5. ^{69/} This value was divided by 1.116 to convert it to an average 1955 dollar/1955 ruble ratio (see footnote l, above).

y. The US-weighted 1 July 1955 ruble/1955 dollar ratio for industrial machinery and equipment (0.400), ^{70/} multiplied by 1.116 to convert it to an average 1955 ruble/1955 dollar ratio (see footnote l, above).

z. The Soviet-weighted 1955 dollar/1 July 1955 ruble ratio for industrial construction is estimated to be 1.396. ^{71/} This value was divided by 1.030 to convert it to an average 1955 dollar/1955 ruble ratio (see footnote n, above).

aa. The US-weighted 1 July 1955 ruble/1955 dollar ratio for industrial construction (0.710), ^{72/} multiplied by 1.030 to convert it to an average 1955 ruble/1955 dollar ratio (see footnote n, above).

bb. Estimates of this Office give 1955 ruble/1963 dollar ratios of 0.43 for civilian research and development with both Soviet and US weights.

cc. The value of Soviet foreign aid is estimated directly in current dollars without the use of dollar/ruble ratios (see p. 28, above). No attempt was made to value US foreign aid in rubles.

S-E-C-R-E-T

S-E-C-R-E-T

Table 10

US: Gross National Product, by End Use, in 1955 Rubles a/
1955-64

	Billion 1955 Rubles									
	1955 Ruble/ 1963 Dollar Ratios (US Weights) b/									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Consumption	354.8	365.9	371.8	370.7	393.9	405.4	409.5	430.5	445.4	471.0
Household consumption	334.7	344.3	349.2	346.5	368.1	378.5	381.6	401.2	414.8	438.8
Food	1.566	118.5	123.4	124.8	124.2	127.5	129.4	130.6	134.5	136.4
Nonfood goods	1.776	170.3	170.7	174.4	170.5	186.8	191.8	192.9	206.2	215.6
Consumer services	0.458	45.9	50.2	50.0	51.8	53.8	57.3	58.1	60.5	62.8
Health and education	0.566	20.1	21.6	22.6	24.2	25.8	26.9	27.9	29.3	30.6
Investment	69.2	70.2	68.7	58.6	70.3	69.7	69.2	76.8	78.5	83.8
Fixed investment	60.4	61.0	61.0	57.0	63.8	63.1	62.8	67.4	70.1	74.2
Machinery and equipment	0.708	20.3	22.4	22.1	17.6	19.3	20.6	19.6	22.0	23.4
Construction	0.732	40.1	38.6	38.9	39.4	44.5	42.5	43.2	45.4	46.7
Inventories	0.806	5.6	4.4	1.6	-1.5	5.4	2.9	1.6	4.9	3.7
Other c/	0.730	3.2	4.8	6.1	3.1	1.1	3.7	4.8	4.5	4.7
Defense	16.1	16.1	17.3	17.3	17.8	17.5	18.8	20.8	21.2	20.5
Administration	0.208	3.8	3.7	3.8	4.4	4.2	4.4	4.6	4.7	4.9
Total gross national product	443.9	455.9	461.6	451.0	486.2	497.0	502.1	532.8	550.0	580.6

a. The ruble values of the US components of gross national product, except for defense, were derived by multiplying the dollar values in Table 7 by the 1955 ruble/1963 dollar ratios in this table. The ruble value of defense in each year was calculated by multiplying the dollar values in Table 7 by the US-weighted ruble/dollar ratios in Table 12.

b. From Table 9.

c. Including net foreign investment, military assistance, and defense stockpiling. "Other investment" is converted at the weighted average of the ratios for the other components of investment.

Table 11

USSR: Gross National Product, by End Use, in 1963 Dollars a/
1955-64

	Billion 1963 US \$									
	1963 Dollar/ 1955 Ruble Ratios (USSR weights) b/									
	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Consumption	121.1	127.7	135.5	142.7	150.2	158.3	165.6	175.6	181.3	190.4
Household consumption	87.3	92.9	99.2	104.4	110.5	115.9	120.6	127.5	131.0	137.3
Food	0.951	51.6	54.5	58.1	59.9	62.3	63.9	65.8	68.9	69.6
Nonfood goods	0.609	13.2	14.3	15.0	16.4	17.7	19.1	19.9	20.9	21.3
Consumer services	4.011	22.5	24.1	26.1	28.1	30.5	32.9	34.9	37.7	42.9
Health and education	33.8	34.8	36.3	38.3	39.7	42.4	45.0	48.1	50.3	53.1
Wages	5.932	30.8	31.4	32.6	34.4	35.6	38.0	40.3	43.3	47.5
Materials	1.001	3.0	3.4	3.7	3.9	4.1	4.4	4.7	4.8	5.6
Investment	38.0	45.7	52.3	60.5	67.1	68.0	74.1	78.5	82.2	92.0
Fixed investment	34.9	41.0	46.0	53.5	59.8	64.4	68.2	72.5	76.9	84.3
Machinery and equipment	2.555	15.8	19.7	21.7	25.3	27.3	29.1	32.4	36.0	43.9
Construction	1.394	19.1	21.3	24.3	28.2	32.5	35.3	35.8	36.5	40.4
Inventories	1.430	3.1	4.7	6.3	7.0	7.3	3.6	5.9	6.0	7.7
Defense	52.3	47.9	43.7	43.2	43.0	42.5	41.5	44.3	43.5	43.3
Administration	4.819	14.0	14.5	14.5	14.5	14.9	15.9	16.4	16.4	16.9
Statistical discrepancy	1.430	0	2.3	-1.3	4.1	-1.3	1.7	5.4	1.0	-0.7
Total gross national product	225.4	238.1	244.7	265.0	273.5	285.4	302.5	315.8	322.7	345.2

a. The dollar values of the Soviet components, except for defense, were derived by multiplying the ruble values shown in Table 8 by the 1963 dollar/1955 ruble ratios in this table. The Soviet defense programs were priced year by year directly in dollar prices by this Office; the implicit Soviet-weighted ruble/dollar ratio is shown in Table 12.

b. From Table 9. The statistical discrepancy was converted from rubles to dollars by means of the dollar/ruble ratio for inventories.

Table 12

US and USSR: 1955 Ruble/1963 Dollar Ratios
for Gross National Product, by End Use
1955-64

	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>
Gross national product										
US weights a/	0.953	0.948	0.948	0.941	0.948	0.946	0.941	0.941	0.942	0.949
USSR weights b/	0.579	0.593	0.604	0.611	0.615	0.617	0.617	0.613	0.610	0.609
Geometric average c/	0.743	0.750	0.757	0.758	0.764	0.764	0.762	0.759	0.758	0.760
Consumption										
US weights a/	1.154	1.134	1.137	1.119	1.127	1.115	1.112	1.115	1.114	1.121
USSR weights b/	0.742	0.745	0.749	0.747	0.748	0.742	0.737	0.731	0.723	0.717
Geometric average c/	0.925	0.921	0.923	0.914	0.918	0.910	0.905	0.903	0.897	0.897
Investment										
US weights a/	0.729	0.728	0.726	0.723	0.730	0.728	0.726	0.729	0.727	0.727
USSR weights b/	0.582	0.575	0.579	0.579	0.583	0.576	0.574	0.567	0.561	0.561
Geometric average c/	0.651	0.647	0.648	0.647	0.652	0.648	0.646	0.643	0.639	0.639
Defense										
US weights d/	0.358	0.364	0.369	0.375	0.380	0.386	0.391	0.397	0.402	0.403
USSR weights d/	0.298	0.309	0.320	0.331	0.342	0.353	0.364	0.375	0.386	0.386
Geometric average e/	0.327	0.335	0.344	0.352	0.360	0.369	0.377	0.386	0.394	0.394
Administration e/	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208

a. The ruble value of US expenditures in Table 10 divided by the dollar value of US expenditures in Table 7.

b. The ruble value of Soviet expenditures in Table 8 divided by the dollar value of US expenditures in Table 11.

c. The geometric mean of the US-weighted and Soviet-weighted ruble/dollar ratios.

d. The US-weighted and Soviet-weighted ruble/dollar ratios for each year are the result of comparing US expenditures in dollars with US expenditures priced directly in rubles and Soviet expenditures priced directly in rubles and dollars.

e. The US-weighted and Soviet-weighted ruble/dollar ratios for administration are the same (see Table 9).

Table 13

US and USSR: National Policy Expenditures
1955-63

	Billion Rubles (1955 Prices) and Billion US \$ (1963 Prices)								
	1955	1956	1957	1958	1959	1960	1961	1962	1963
National policy expenditures									
Dollars									
United States	97.5	101.9	106.1	100.9	102.8	105.4	108.6	115.8	119.3
USSR	89.9	89.1	88.0	90.6	95.6	100.4	101.9	109.9	113.6
Education									
Dollars									
United States <u>a/</u>	20.1	21.0	21.4	23.1	24.3	25.5	26.4	27.3	28.9
USSR <u>b/</u>	20.2	21.0	22.1	22.7	24.1	25.9	28.0	30.2	32.2
Rubles									
United States <u>c/</u>	9.7	10.1	10.3	11.0	11.5	12.0	12.5	12.8	13.5
USSR <u>d/</u>	5.2	5.6	6.0	6.1	6.7	7.4	8.0	8.8	9.5
Industrial investment									
Dollars									
United States <u>e/</u>	23.0	26.2	26.9	20.9	21.0	23.3	22.4	23.5	24.6
USSR <u>f/</u>	15.7	18.4	19.8	22.2	25.9	28.7	28.6	30.7	32.8
Rubles									
United States <u>g/</u>	13.2	15.1	15.5	12.0	12.1	13.4	12.9	13.5	14.2
USSR <u>h/</u>	7.7	8.8	9.2	10.4	12.0	13.3	13.6	14.6	15.5
Civilian research and development									
Dollars									
United States <u>i/</u>	3.9	4.9	5.1	5.3	5.6	6.2	6.3	6.6	7.0
USSR <u>j/</u>	1.2	1.4	1.5	1.8	2.1	2.4	2.8	3.1	3.7

Table 13
(Continued)

Civilian research and development
(Continued)

Rubles	United States k/ USSR l/	1.7 0.5	2.1 0.6	2.2 0.6	2.3 0.8	2.4 0.9	2.6 1.0	2.7 1.2	2.9 1.3	3.1 1.6
Foreign aid										
Dollars										
United States m/ USSR n/	5.4 0.5	5.5 0.4	5.8 0.9	5.5 0.7	5.0 0.5	5.1 0.9	5.4 1.0	5.9 1.6	6.1 1.4	
Defense										
Dollars										
United States o/ USSR p/	45.1 52.3	44.3 47.9	46.9 43.7	46.1 43.2	46.9 43.0	45.3 42.5	48.1 41.5	52.5 44.3	52.7 43.5	
Rubles										
United States q/ USSR r/	16.1 15.6	16.1 14.8	17.3 14.0	17.3 14.3	17.8 14.7	17.5 15.0	18.8 15.1	20.8 16.6	21.2 16.8	

a. The sum of noninvestment and investment expenditures for education in the United States in 1963 dollars. Non-investment expenditures on education in current dollars from Table 6 have been deflated by a combined index of wages in education (weight = 0.75) and an index of prices for nondurable goods (weight = 0.25). The wage index is based on the Department of Commerce series of average annual earnings in public education, in educational services not elsewhere classified, and in commercial and trade schools. The index for nondurable goods is the Department of Commerce deflator for nondurable goods. Investment expenditures in current dollars are from Table 6. These expenditures have been converted to 1963 dollars by the implicit price deflator for new public construction of non-residential buildings. For the sources of the deflators used for noninvestment as well as investment expenditures, see Table 9, footnote a/.

b. Soviet expenditures for education (investment, wages, and materials purchases) in rubles multiplied by the 1963 dollar/1955 ruble ratios derived in Table 9.

c. US expenditures for education (investment and noninvestment) multiplied by the 1955 ruble/1963 dollar ratios derived in Table 9.

Table 13

US and USSR: National Policy Expenditures
1955-63
(Continued)

d. The values of Soviet expenditures in 1955 on wages and materials purchases in education are estimated [redacted]. The value for wages in 1955 was moved forward by an index of employment in education, excluding science. ^{74/} The value of materials purchases in 1958 was moved forward by an index estimated by this Office from Soviet budget data. Soviet investment in education is also estimated from budget data.

e. US expenditures for industrial investment in current dollars include expenditure on new plant and equipment in manufacturing, mining, and public utilities and construction activity in petroleum and natural gas drilling. ^{75/} The value in current dollars was deflated to 1963 prices by the use of unpublished separate deflators for investment in manufacturing, mining, and public utilities supplied by the Department of Commerce.

f. Soviet expenditures for industrial investment (machinery and equipment and construction) in rubles multiplied by the 1963 dollar/1955 ruble ratios derived in Table 9.

g. US expenditures for industrial investment multiplied by the 1955 ruble/1963 dollar ratios derived in Table 9. Investment in 1963 dollar prices was assumed to be half equipment and half construction. Although there is no reliable way of estimating this breakdown, the division used corresponds roughly to that estimated in source ^{76/}.

h. Soviet data on investment in industry (excluding investment in pipelines) in estimate prices was divided into machinery and equipment and construction-installation work (including associated costs), using the relative shares shown in source ^{77/}. Expenditures on machinery and equipment and on construction-installation work were converted to average 1955 prices by multiplying the values in estimate prices by factors of 1.127 and 0.966, respectively. These adjustments are based on data reported in source ^{78/}.

i. US civilian research and development expenditures in current prices were estimated by subtracting 90 percent of federal funds spent on research and development (the approximate magnitude of research and development expenditures for defense) from estimated total expenditures for research and development. ^{79/} The residual values were converted to 1963 prices by a price index for research and development estimated by this Office.

j. Soviet expenditures for civilian research and development in rubles multiplied by the 1963 dollar/1955 ruble ratio derived in Table 9.

k. US expenditures for civilian research and development in dollars multiplied by the 1955 ruble/1963 dollar ratio derived in Table 9.

l. Estimates of this Office.

m. US expenditures in current dollars estimated as the sum of gross new grants under assistance programs, new credits, and other assistance through the net accumulation of foreign currency claims. ^{80/}

n. The sum of current dollar values of drawings on economic aid to Communist countries and military and economic aid to non-Communist countries as estimated by this Office.

o. From Table 7.

p. From Table 11.

q. From Table 10.

r. From Table 8.

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Table 14

Previous Ruble and Dollar Estimates
of Soviet and US Gross National Product, by End Use
1963

	Ruble Comparison			Dollar Comparison		
	(1)	(2)	(3)	(4)	(5)	(6)
	US-Weighted 1955 Ruble/ 1963 Dollar Ratios a/*	Billion 1955 Rubles		Soviet-Weighted 1963 Dollar/ 1955 Ruble Ratios a/	Billion 1963 Dollars	
		US b/	USSR c/		US d/	USSR e/
Consumption	1.089 f/	435.2	131.0	1.454 g/	399.8	190.5
Household consumption	1.174 f/	405.7	118.2	1.110 g/	345.7	131.2
Food	1.566	136.4	73.2	0.951	87.1	69.6
Nonfood goods	1.701	206.5	35.0	0.615	121.4	21.5
Consumer services	0.458	62.8	10.0	4.011	137.2	40.1
Health and education	0.546	29.5	12.8		54.1	59.3
Wages			7.6	7.118		54.1
Materials			5.2	1.001		5.2
Investment	0.612 f/	66.1	51.4	2.115 g/	108.0	108.7
Fixed investment	0.603 f/	58.4	42.4	2.175 g/	96.9	92.2
Machinery and equipment	0.590	19.5	15.3	3.066	33.1	46.9
Construction	0.610	38.9	27.1	1.673	63.8	45.3
Inventories	0.806	3.7	3.7	1.430	4.6	5.3
Other	0.612 h/	4.0	5.3	2.115 h/	6.5	11.2
Defense	0.402	21.2	16.8	2.591	52.7	43.5
Administration	0.173	4.0	3.4	5.783	23.4	19.7
Statistical discrepancy			-1.9	1.430		-2.7
Total gross national product	0.902 f/	526.5	200.7 i/	1.792	583.9	359.7

* Footnotes follow on p. 56.

Table 14

Previous Ruble and Dollar Estimates
of Soviet and US Gross National Product, by End Use
1963
(Continued)

- a. From Table 9 unless otherwise indicated.
- b. The product of columns 1 and 5 except for consumption, household consumption, health and education, investment, and fixed investment, which are the sums of their respective components.
- c. From Table 8, except "other investment." Other investment is the sum of capital repairs and civilian research and development derived from Soviet data.
- d. From Table 7.
- e. The product of columns 3 and 4, except for consumption, household consumption, health and education, investment, and fixed investment, which are the sums of their respective components.
- f. Column 2 divided by column 5.
- g. Column 6 divided by column 3.
- h. The ratio for "other investment" is a weighted average of the ratio for the other components of investment.
- i. The 1955 value of Soviet gross national product (GNP) given by the sum of four end-use components (including other investment) moved forward by means of an index of GNP by sector of origin (see p. 12, above).

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APPENDIX C

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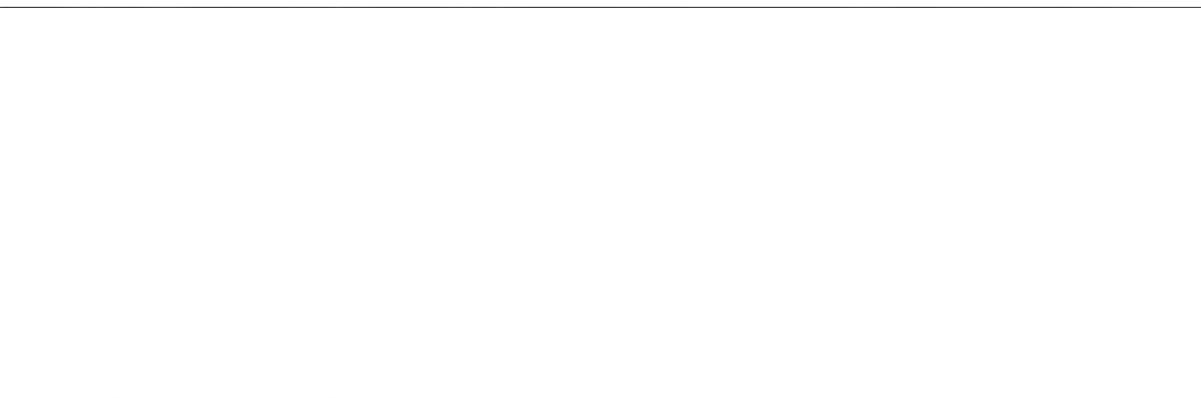
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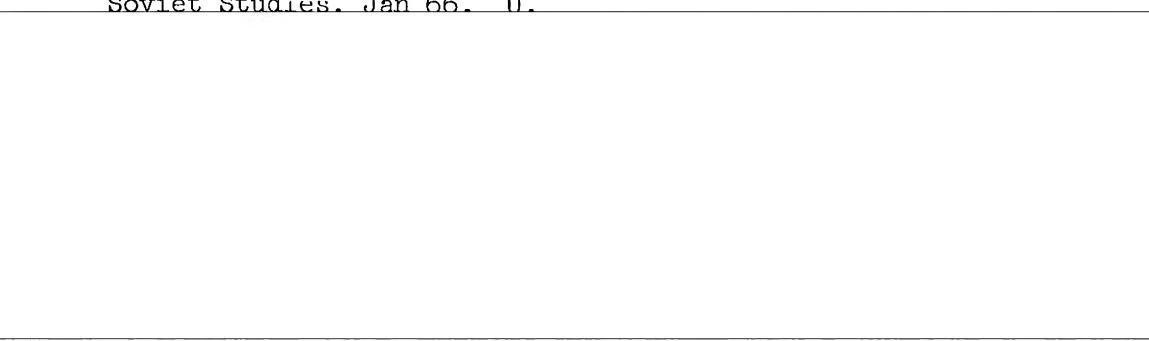
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